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VOLUME ONE

DOCUMENT HISTORY OF DISCOVERER

SPACE AND MISSILE SYSTEMS ORGANIZATION

HISTORY OFFICE
CHIEF OF STAFF
SPACE AND MISSILE SYSTEMS ORGANIZATION
AIR FORCE SYSTEMS COMMAND

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DOCUMENT HISTORY OF DISCOVERER

Prepared under the provisions of Air Force Regulation 210-3 and Air Force Systems Command Supplement No. 1 thereto as part of the United States Air Force Historical Program.

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DOCUMENT HISTORY OF DISCOVERER

VOLUME 1

Prepared by

S. A. Grassly

November 1971

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History Office
CHIEF OF STAFF
SPACE AND MISSILE SYSTEMS ORGANIZATION

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WDD/AFBMD/SSD/SAMSO

DOCUMENT HISTORY OF DISCOVERER

VOLUME 1

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LIST OF SUPPORTING DOCUMENTS

HISTORY OF DISCOVERER

1. ARDC Weekly Activity Report, 4 Feb 1957 (Integration of Qualitative Personnel Requirements Activities at Western Development Division).

2. ARDC Form 111 (C/Gp3), Title: Advanced Reconnaissance System, 31 Jan 57.

3. R-W Document GM67.3-49, subj: Proposed Use of IRBM as Booster for Multi-Stage Vehicles, 1 Apr 1957.

4. DD Form 613 (C/Gp3), Project Number: 1764, 2 Apr 57.

5. DD Form 613 (C/Gp3), Project Number: 8727, 2 Apr 57.

6. Ltr, The Ramo-Wooldridge Corporation to Col E. N. Hall, from R. F. Mettler, subj: Transmitting copy of GM67.3-49, 3)May 57, w/o Inclosure. /See inclosure under date of 1 Apr 57/.

7. Memorandum for Colonel Terhune, subj: AFPTRC Support of WDD System Development, 23 Jul 57.

8. Memorandum for WDT and WDO, subj: Joint WDTN and WDOTA Staff Visit Report to Hq ARDC on Elimination of AFPTRC as a Separate Center of ARDC, 19 Nov 57.

9. Memorandum for the Record, subj: Telephone Call from Colonel Nunziato to General Ritland, 31 Dec 57.

10. Msg, from Comdr AFBMD to Comdr Hq ARDC, WDG-1-2, 3 Jan 58.

11. Ltr (C/Gp3), Lockheed Aircraft Corporation to MajGen Bernard A. Schriever, subj: Contract AF 04(647)-97, Proposal for Acceleration of WS 117L Program, 6 Jan 58.

12. Development Plan (C/Gp3), cover and introduction only for WS 117L, 6 Jan 58.

13. Conference msg regarding ARDC Five Year Projected Astronautics Program, 6 Jan 58.

14. Ltr (C/Gp3), WDP to Chief of Staff USAF, subj: Thor Program Acceleration, 6 Jan 58, w/4 Inclosures: 1. Program Summary; 2. Fund Summary; 3. Augmented Schedules; 4. Fund Summary (R&D Augmentation).

15. Ltr, ARDC (RDTHW) to Comdr AFBMD, subj: Elimination of AFPTRC and Assignment of Specific Human Factors Functions to AFBMD, 13 Jan 58.

16. Memorandum for the Record, WDTD, subj: Long-Distance Call from Colonel Attwood - ARDC - re "Recoverable Package," 13 Jan 58.

17. Memorandum For the Record, MCPTA, subj: Plan for Acceleration of the WS 117L Program, 21 Jan 58.

18. Msg, from Hq USAF to Comdr AFBMD, Cite AFCGM 55420, 211805Z Jan 58.

19. Msg, from Hq USAF to Comdr AFBMD, cite AFCGM 39578, 222106Z Jan 58.

20. Msg, Hq USAF to Comdr ARDC, info Comdr AFBMD, Cite AFDDC-SP 55521, 222214Z Jan 58.

21. Weekly Diary - 16 thru 23 Jan 58 from MCPTA to MCPT [AMC/BMC], 23 Jan 58.

22. Memorandum for Record, WDTIM, subj: Lockheed/Douglas WS-117L Co-ordination Meeting, 27 Jan 58, 28 Jan 58.

23. Msg, Hq USAF to Comdr AFBMD, info Comdr AFBMC/AMC, Cite AFCGM 56224, 061543Z Feb 58.

24. Memo to File, subj: Thor-117L Integration, 12 Feb 58.

25. Memorandum for the Secretary of Defense (C/Gp3), subj: Thor and WS-117L Program, 14 Feb 58.

26. Msg, Attn: Colonel F. C. E. Oder, WDTR, from F. W. O'Green, Lockheed Missile Systems Div Palo Alto Calif, subj: WS 117L - Reconnaissance Capsule, 18 Feb 58.

27. Memorandum for the Director of Guided Missiles, OSD, sgd Malcolm A. MacIntyre, Under Secretary, 21 Feb 58.

28. GO No. 11, ARDC, 27 Feb 58.

29. OSD Memorandum (C/Gp3), for Secretary of the Air Force, subj: Reconnaissance Satellites and Manned Space Exploration, 28 Feb 58.

30. Msg (C/Gp3) from Comdr AFBMD to Lockheed Aircraft Corporation, 12 Mar 58.

31. Memorandum for the Record, WDGE, subj: Call from Colonel Oder in Washington to Colonel Hamilton, 13 Mar 58.

32. WDTSR Memorandum for Major General Funk (C/Gp3), subj: Reorientation WS 117L Program IIA, 14 Mar 58.

33. Memorandum for the Director, ARPA, OSD, subj: Air Force Man-in-Space Program, 19 Mar 58.

34. Memorandum for Vice Chief of Staff, sgd MajGen J. S. Mills, subj: Man in Space Program, 20 Mar 58.

35. WDTSR Memorandum for Colonel Terhune, subj: Reply to Inquiry, 24 Mar 58.

36. Msg from Comdr ARDC to Comdr AFBMD, Cite TWS 03-24-06, 242015Z Mar 58.

37. WS 117L Project Office New Phone Extensions, 17 Apr 58.

38. Memorandum for Colonel Evans, sgd Col C. H. Terhune, Jr., subj: Man in Space Responsibilities, 28 Apr 58.

39. WDGO Memorandum for Col Terhune, sgd BrigGen O. J. Ritland, subj: Bio-Medical, Thor Boosted WS 117L Program, 5 May 58.

40. Ltr from Lockheed Aircraft Corp to Comdr AFBMD, subj: Contract No. AF 04(647)-181 Biosatellite Flight Plan, 6 May 58.

41. Ltr (S/Gp3), ARDC (RDZGW) to Comdr AFBMD, subj: Support of Bioastronautics Program, 22 May 58.

42. GO No. 18, ARDC, 22 May 58.

43. Functional Statement - Human Factors Division, 12 Jun 58.

44. Memorandum for the Director, ARPA (C/gp3), sid Malcolm A. MacIntyre, Under Secretary, 12 Jun 58.

45. Department of the AF Memorandum for the CofS, USAF, (C/Gp3), 24 Jun 58.

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51. Ltr, ARDC (RDTH) to Comdr Air University, subj: Responsibilities of School of Aviation Medicine in the ARDC Biosatellite Program, Sub-System L WS-117L, 12 Aug 58.

52. Ltr, AFBMD (WDTSR) to Lockheed Aircraft Corp., subj: Contract 04(647)-181, Internal Air Force Responsibilities Concerning Biosatellite Programs, 4 Sep 58.

53. ARPA Order No. 17-59, 4 Sep 58.

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55. ARPA Order No. 17-59, Amendment No. 1, 29 Sep 58.

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57. ARPA ltr (C/Gp3), to Comdr ARDC, no subj, 25 Nov 58

58. ARPA Order No. 17-59, Amendment No. 3, 26 Nov 58, w/2 Atch: 1. Preparation of Monthly Progress Report; 2. Vehicle Requirements List.

59. Msg from Comdr ARDC to Comdr AFBMD, RDZGW-11-39-E, 262100Z Nov 58.

60. ARPA Memorandum for the Secretary of the AF, (C/Gp3), subj: WS-117L Program, 4 Dec 58.

61. ARPA Memorandum for the Under Secretary of the Air Force (C/Gp3), subj: Discoverer-Thor Project and Sentry Programs, 5 Dec 58.

62. Msg from Hq USAF to Comdr AFBMD, info Comdr ARDC, 37375, 052240Z, Dec 58.

63. Msg (C/Gp3), from OSD, ARPA, to Comdr ARDC, info Comdr AFBMD, DEF 951903, 0522223Z

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66. Msg (C/gp3) from Hq USAF to Comdr AFBMD, info Comdr ARDC, AFDAT 54519, 3015207 Dec 58.

67. Chart, Financial Management Status, Lockheed AF 04(647)-97, 181, 31 Dec 58.

68. Contractor Manpower Status Lockheed-AF (04(647)-97-181, 31 Dec 58.

69. Msg from Comdr AFBMD to Comdr 1st Missile Div, info AFBMD Field Office, WDTI-1-38-E, 3 Feb 59.

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73. Msg from Comdr AFBMD to CofS, USAF, info Comdr ARDC, WDPP-3-1, 7 Mar 59.

74. Msg from Comdr AFBMD to Dir ARPA, Info CofS USAF, Comdr ARDC, Lockheed Missiles and Space Div, Ch, AFBMD Field Office, Palo Alto, WDZW 3-15-E, 17 Mar 59.

75. Msg from Hq USAF to AFBMD, Info ARDC, AYAPF 57888, 181447Z Mar 59.

76. Ltr, AFBMD (WDTI) to Mr. Donald W. Douglas, Jr., President, Douglas Aircraft Company, Inc., no subj: 18 Mar 1959.

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82. Msg (C/Gp3) from Hq Usaf to Comdr AFBMD, AFDAT 59353, 272059Z Apr 59.

83. WDD Routing Slip, 29 Apr 59.

84. Msg from AFBMD-ARDC/AMC-BMC to Lockheed Aircraft Corporation, LBJP-4-15-E 29 Apr 59.

85. Ltr AFBMD (WDZW) to The Honorable Malcolm A. MacIntyre, no subj, 1 May 59.

86. Discoverer Monthly Program Progress Report, 8 May 59.

87. ARPA Order No. 17-59, Amendment No. 6, 18 May 59.

88. AFBMD (WDZ) Memorandum for AFBMD Directors, subj: ARPA Order 17-59 (as amended), 18 May 59.

89. Ltr (C/Gp3), AFBMD (WDTR) to Director of Laboratories, WADC, subj: Short Title: ICBMCOD, 3 Jun 59.

90. Para 4, Weekly Diary - 11 thru 18 Jun 59 from BMC (LBJ) 18 Jun 59.

91. ARPA Order No. 17-60, Amendment No. 8, 1 Jul 59.

92. ARPA Order No. 48-59, Amendment No. 4, 20 May 59.

93. Discoverer Progress Report, 31 May 1959, dated 8 Jun 59.

94. ARPA Order No. 48-59, Amendment No. 5, 23 Jun 59.

95. ARPA Order No. 48-60, Amendment No. 6, 20 Jul 59.

96. Discoverer Program Progress Report, 31 Jul 59, dated 7 Aug 59.

97. AFBMD Ltr (WDZPB, to MajGen Otis O. Benson, Jr., Commandant USAF School of Aviation Medicine, no subj, 18 Aug 59.

98. Discoverer Program Progress Report, 31 Aug 59.

99. ARPA Order No. 48-60, Amendment No. 7, 8 Oct 59.

100. AFBMD Ltr, (WDG), subj: Investigating Committee, 29 Oct 59.

101. Discoverer Program Progress Report, 9 Nov 59.

102. Management Report, Advanced Reconnaissance System, 13 Nov 59.

103. Secretary of Defense Memorandum for the Secretary of the AF subj: Transfer of the Discoverer Development Program to the Department of the Air Force, 17 Nov 59.

104. SO Number 20, AFBMD, 27 Nov 59.

105. ARPA Order No. 48-60, Amendment No. 8, 3 Dec 59.

106. SOD Memorandum for the Asst Secy of Defense (Comptroller) (C/Gp3), 7 Dec 59.

107. Msg, S/Gp3) from Hq USAF to AFBMD and ARDC, AFABF and AEDDP 73993, 271712Z Feb 60.

108. Ltr (C/Gp4) from AFBMD (WDZYD, subj: Procurement of Four Follow-on Agena Vehicles for Discoverer Program, 14 Mar 60.

109. Ltr (C/Gp4) from AMC/BMC (LBZJR, subj: Discoverer Schedule Revision, 4 Oct 60.

110. Ltr (S/Gp3), Dept AF (AFDSD-AT) to ARDC, subj: Exploitation of Initial SAMOS Data, 1 Jun 60.

111. Ltr (C/Gp4), AMC/BMC (LBZJR to LBZJP, subj: DISCOVERER Schedule Revision, 4 Oct 60.

112. Msgs from Hq ARDC, RDGP-12-10-2 and RDGP-12-10-1, 12 Oct 60.

113. Msg from AFBMD to Missiles and Space Div Lockheed Aircraft Corp, WDE 24-10-179, 24 Oct 60.

114. Msg from Hq USAF to ARDC, info AFBMD, AF Air Museum, SAFOI 90547, 282054Z Oct 60.

115. Ltr Hq AMC to LtGen B. A. Schriever, 2 Dec 60.

116. Ltr ARDC (RDE), subj: Anniversary Flight Ceremonies, 7 Dec 60.

117. Msg from ARDC to AFBMD, RDEP 7-12-16, 071924Z Dec 60.

118. Msg from Hq ARDC to AFBMD, RDEI 8-12-19, 082043Z Dec 60.

119. Msg from AFBMD (WDEC) to WDG, subj: Presentation of Discoverer XIV Capsule, 9 Dec 60.

120. Suggested Remarks for MajGen O. J. Ritland Commander, AFBMD, at the Wright Day Luncheon, 16 Dec 60.

121. News Release 61-30, subj: Mackay Trophy for 1960.

122. SAFOI-3B Biomedical Release, 12 Jan 61.

123. Discoverer Program Chronology, 1 Jul - 31 Dec 60, (C/Gp4), 24 Jan 61.

124. 552 Airborne Early Warning and Control Wing (ADC) News Release: 1-4, 17 Feb 61.

125. Ltr, AFBMD (WDZJS-1, subj: Request for PR Initiation, 13 Mar 61.

126. AMC (LBZJP) ltr, subj: Authorization for Type of Contract, 28 Mar 61.

127. Ltr (S/Gp3), from Comdr, PMR to Comdr AFBMD, subj: Bioastronautics Orbiting Space System (BOSS) Development Plan; comments on, 28 Mar 61.

128. Msg (S/Gp4) from Hq AFSC to SSD LosA, SCG 10-5-27, 102210Z May 61.

129. Ltr (S/Gp3) from AFSC (SCRBS) sgd LtGen B. A. Schriever, to Hq USAF (AFDDC), subj: Bioastronautics Development Plan, 16 May 61.

130. Ltr (C/Gp4) from SSD (SSP) to LtGen B. A. Schriever, subj: Development Plans in Support of Five-Year Space Plan, 31 May 61.

131. Ltr (S/Gp3) from Hq USAF (AFDRT) to ATC and AFSC, subj: Radiation Shielding, 8 Jun 61.

132. Ltr (S/Gp3) from Hq USAF (AFFDDC) to AFSC, subj: Bioastronautics Orbital Space Program (BOSP), 12 Jun 61.

133. Ltr (S/Gp3) from Hq AFSC (SCRBS) to SSD (AFSC) and ATC, subj: Bioastronautics Orbital Space Program (BOSP), 22 Jun 61.

134. Discoverer Milestones, 12 Jul 61.

135. MFR (C/Gp4), SSRBT-2, subj: Preliminary Data on Disc 27 Flight Failure, 24 Jun 61.

136. Memorandum for MajGen Ritland, subj: Routine and Special Investifations and Analysis of Discoverer Operations, Aug 61.

137. Msg (C/Gp4) from G. A. Devine, Sunnyvale, Calif, to SSD/SSZD, subj: ROM Quotation for Additional Discoverer Vehicles Nos 1129, 1130 and 1131 to Discoverer Contract AF 04(647)-673, 112135Z Aug 61.

138. UPI press release, 28 Aug 61.

139. DOD Instructions, subj: Policy on Experimental Animals in Department of Defense Research (No. 3216.1) 1 Sep 61.

140. Ltr, Department of State, Washington, to Mr. Huntoon, 15 Sep 61.

141. Msg (S/Gp3) from OSAF to AFSC, DCAS, LosA, SAFS 83174, 042206Z Dec 61.

142. UPI and AP News Releases, 12 Dec 61.

143. Ltr (C/Gp4) from Hq PMR to Comdr SSD, AFSC, subj: Space Program 698AA (BOSS) Development Plan; comments on, 11 Jan 62.

144. ADO No. 35 (C/Gp3), subj: Advanced Development Objective for a Bioastronautical Space Test Program, 18 Feb 62.

145. Ltr from SSD (SSZDB) to SSVX, subj: Discoverer Performance Improvement, 27 Feb 62.

146. Ltr from SSD (SSVXE) to SSVXX, subj: Thorad Jr DSV-2C Study for Discoverer, 2 Mar 1962.

147. Ltr (uncl w/o atch) from SSZDT to SSEH, subj: 622A Program Summary -- Historical Report, 23 Jul 62, w/1 atch: 622A Historical Report.

148. Memorandum for the Under Secretary of the Air Force, subj: Joint Air Force/NASA Bioastronautics Program (698 AA), 23 Jul 62.

149. Msg (C/Gp4) from Hq USAF to SSD LosA and MFSA, AFRAE-S-4, 122147Z Sep 62.

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152. History Program 162 CY 1962, (C/Gp4).

153. Relocation List, 31 Jan 63.

154. Background of Biomedical Capsule Development, Jun 63.

155. History of Program 162, 1 Jan 63 to 30 Jun 63 (S/Gp4).

156. Ltr from SSD (SSZ) to AFSC (MSF), subj: AF Support of Bioastronautics Program 698AA, 2 Aug 63.

157. Ltr sigd MajGen Ben I Funk to AFSC (MSF), subj: Air Force Support of Bioastronautics Program 698AA, 26 Nov 63.

158. Ltr from AFSC (SCG) to SSD (SSG), subj: Program 698AA, 9 Dec 63.

159. Ltr (C/Gp4) from AFSC (SCG) to SSD (SSG, Gen Funk), subj: Manned Space Program, 16 Dec 63.

160. History of Program 162, 1 Jul-31 Dec 63, 8 Jan 64, (C/Gp4).

161. Msg (C/Gp4) from AFSC to SSD LosA, MSF 3-3-2, 032229Z Mar 64.

162. Msg (C/Gp4) from SSD LosA to MSF, SSGC -3-7, 6 Mar 64.

163. SO PB-17, SSD, 1 Apr 64.

164. SO PB-22, SSD, 22 Apr 64.

165. History of Program 162, 1 Jan 64 to 30 Apr 64, 21 Aug 64.

166. News Release 65-149, 31 Aug 65.

167. Appendix to History of Discoverer, List of Launches, 21 Jan 59 to 27 Apr 64.

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(UNCLASSIFIED) INTEGRATION OF QUALITATIVE PERSONNEL REQUIREMENTS ACTIVITIES AT WESTERN DEVELOPMENT DIVISION:

(UNCLASSIFIED) In May 1956, AFPTRC established a liaison office at WDD for the purpose of coordinating Qualitative Personnel Requirements activities. Since that date, personnel and training requirements studies have been initiated on all weapon systems being developed by WDD. Two formal reports have been issued on System 107A-1, and an initial report published on System 315A. An initial report on System 107A-2 is scheduled for April 1957. The impact of these studies on development activities is much greater when ARDC has been assigned responsibility for the Initial Operational Capability since ARDC becomes the implementing agency in these cases. The QPRI reports have been used to prepare manning documents, determine over-all training requirements, plan training courses, and to provide a source of data for technical manuals. In view of the above, it is apparent that a satisfactory and useful QPRI program has been established at WDD. (RDTDJT, Capt. Nichols, ext 32).

COPY

copied from ARDC Weekly Activity Report dated 4 February 1957 WDSIT-57-468
C7-40605, pages 6 and 7.

MAR 6 1957

(3) Reviews reports of progress and findings received from contractor or other agencies pertaining to personnel requirements, training and personnel evaluation. Makes recommendations for acceptance of these reports and for implementing R&D outcomes in system operations.

(4) Determines requirements for technical assistance, information and services of various AFPTRC agencies, or other Air Force agencies, and provides technical assistance as required by WDO. Makes appropriate requests for assistance in the planning and conduct of work for which WDO is responsible.

(5) Coordinates personnel and training R&D activities with other offices of WDO, and with other Air Force agencies participating in the human factors program.

(6) Establishes procedures for the mutual exchange of information between WDD and AFPTRC.

D R A F T

AFPTRC DIRECTIVE

SUBJECT: AFPTRC Participation in WS-107A and WS-315A

1. Purpose. The purpose of this document is to define the participation of AFPTRC in WS-107A and WS-315 and to indicate a manner of integrating this effort with the other portions of the human factors program.

2. Scope. This document reflects the methodology and procedures to be employed in the human factors program as visualized at this time.

3. Responsibilities. AFPTRC is designated the responsible agency for the completion of the tasks defined in ARDC Reg 22-14. The tasks which are of greatest interest to this project are:

   a. Qualitative Personnel Requirements Information (QPRI)

   b. Proficiency Standards and Evaluation - both individual and team.

   c. Command Communications Operability.

   d. Control of Morale Factors.

   e. Social and Community Relation Studies.

4. Integration. The accomplishment of some of the tasks listed above will be aided by the use of a dynamic system mockup, a simulation device or array of devices that will react to controls and display information in the same manner as the operational system. This dynamic mockup will also be used for other human factors work such as human engineering, and may also be used in the training of cadre personnel. To obtain optimum results, the dynamic mockup willbe built unde the sponsorship of WDD and will be controlled by a staff representing all interes agencies. The location of the mockup and the exact composition of the operation effectiveness staff have not been decided at this time; the planning in progress now is aimed at providing the most complete and efficient program.

5. Immediate Procedures. Until such time as the entire human factors program has been approved and implemented, the following steps should be take by AFPTRC:

a. Generation of QPRI from the data provided them by the associate contractors. The Technical Directive establishing the procedures for the Contractors to provide this information has been issued to those major contractors associated with WS-107A.

b. The establishment of a Special Project Officer in residence at WDD, to be empowered to represent AFPTRC on all matters within the scope of an approved WDD human factors program. The representative will be attached to WDO. Administrative support for the office will be provided by WDO, however, the nature of program development and the functions involved require that this officer's services be available to all staff agencies of WDD. His duties will be as follows:

(1) Provides information to WDO staff agencies on status, plans and progress of all activities of personnel and training R&D activities related to weapon system development for which AFPTRC is responsible. Specifically, these activities include:

(a) Qualitative personnel requirements information.

(b) Participation in operations and personnel analysis program.

(c) Individual and team training studies.

(d) Relevant portions of the AFPTRC technical program.

(2) Formulates and recommends requirements to WDO pertaining to R&D activities in the personnel and training area.

(3) Reviews reports of progress and findings received from Contractor or other agencies pertaining to personnel requirements, training and personnel evaluation. Makes recommendations for acceptance of these reports and for implementing R&D outcomes in system operations.

(4) Determines requirements for technical assistance, information and services of various AFPTRC agencies, provides personnel technical assistance as required by WDO and/or makes appropriate requests for such assistance in the planning and conduct of work for which WDO is responsible.

(5) Coordinates AFPTRC personnel and training R&D activities with other offices of WDO, and with other Air Force agencies participating in the human factors program.

(6) Establishes procedures for the mutual exchange of information between WDO and AFPTRC.

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☐ ACTION REQUIRED ☐ CHANGE ☐ SIGNIFICANT EVENT ☐ RESULTS

MANAGEMENT REPORT

☒ SYSTEM ☐ PROJECT ☐ TASK ☐ ENGINEERING SERVICE

2. REPORTS CONTROL SYMBOL

PAGE 1 OF 2 PAG

3. DATE
31 January 1957

4. TITLE
(U) Advanced Reconnaissance System

5. NUMBER
WS 117L - MR #3

6. PREPARING AGENCY
HQ ARDC - WDD

7. RESP ORGN
WDD-WDTR

8. PARTICIPATING CENTERS
AFCRC, WADC, RADC, AFPTRC

9. PROGRAM STRUCTURE
100

10. PARTICIPATION/COORDINATION/INTEREST
USAF/AMC-P, APGC-P, ATC-P, SAC-C, ADC-C
USN/CND-I, USA/C/S-I, Other / CIA-I

11. TECHNICAL GROUP
02

12. APPLICABLE AREAS

A. ☐ TECHNICAL B. ☐ TEST C. ☐ FUNDS D. ☐ MATERIEL E. ☐ FACILITIE

F. ☐ MANPOWER G. ☐ PERSONNEL H. ☐ TRAINING I. ☒ CONTRACTS J. ☐ AIRCRAFT

13. NARRATIVE

a\. Authorization to obligate an additional $2,000,000 beyond the $3,000,000 previously authorized for System 117L was received 7 December 1956, in TWX, HQ USAF, AFDDP-B 33590. ✓

b\. Letter Contract AF 04(647)-103 was let with the Massachusetts Institute of Technology on 25 Jan 1957. Work to be performed is in the Guidance and Control problem area. Funds allocated against this contract total $500,000.

c\. Authority to obligate up to a total of $10,000,000 for FY 57 on the WS 117L program in TWX, HQ ARDC RDSCBC-1-16-E, dated 15 Jan 1957, was received.

d\. Subsystem Project Plans are in the process of being written and Project number and task number assignments have been established. Upon completion of the writing of the Project Plans, a revision will be made to the System Development Plan. Target date for completion of these actions is the anniversary date of the WS 117L Development Plan, 2 April 1957.

e\. Inclosed is a list of project number and task number assignments made during the process of writing Project Development Plans.

f\. (1) PR #57-WDD-196-I dated 22 Jan 1957 was initiated to add $5,563,000 to the Lockheed Aircraft Corporation Contract AF 04(647)-97.

(2) OA #57-17 dated 25 Jan 1957 was initiated to transfer $320,000 to RADC for continued effort in the Data Processing and Dissemination area for WS 117L.

(3) OA #57-15 dated 25 Jan 1957 was initiated to transfer $195,000 to WADC for continued effort in research on conversion equipment for nuclear auxiliary power units and for continued research on solar auxiliary power units for WS 117L.

(4) OA #57-16 dated 25 Jan 57 was initiated for transfer of $422,000 to AFCRC for continued research in the Geophysical Environment Area for WS 117L.

[redacted]

[redacted]

WD-57-00437

[redacted]

ARDC FORM 1 JUL 56 111 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

g. The summary of FY 57 funds initiated on WS 117L is:

Lockheed Aircraft Corporation	AF 04(647)-97	$8,563,000
Massachusetts Institute of Technology	AF 04(647)-103	500,000
WADC	OA #57-15	195,000
RADC	OA #57-~~15~~17	320,000
AFCRC	OA #57-16	422,000
TOTAL		$10,000,000

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1 Incl
  Project Number Assignment
  1 page (SECRET)

Charles H Terhune

CHARLES H. TERHUNE, Jr., Colonel, USAF
Deputy Commander, Technical Operations

[redacted]

[redacted] [redacted]

PROJECT NUMBER ASSIGNMENT

Project #	Project	Task #'s
P 1755	Airframe	39750 - 39767
P 1756	Propulsion	39768 - 39782
P 1757	Auxiliary Power Unit	39783 - 39790
P 1758	Guidance and Control	39800 - 39811
P 1759	Visual Reconnaissance	39812 - 39821
P 1760	Ferret Reconnaissance	39822 - 39831
P 1761	Infra-Red Reconnaissance	39832 - 39839
P 1762	Ground Space Communication	39840 - 39854
P 1763	Data Processing	39855 - 39862
P 1764	Geophysics	39791 - 39799
P 1765	Unassigned	
P 1766	Unassigned	
P 1767	Unassigned	
P 1768	Unassigned	
P 1769	Unassigned	
P 8728	QPRI	39863 - 39864

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COPY

GM67. 3-49
Copy 1 of 3

H. R. Lawrence

A. F. Donovan
P. Dergarabedian

1 April 1957

Proposed Use of IRBM as Booster For Multi-Stage Vehicles

J. B. Kendrick

The accompanying data sheets cover the work done to date on three new designs using the IRBM as booster for the following multi-stage vehicles:

Test Vehicles

1. Two-Stage Re-entry Test Vehicle M = 23 Payload 500 pounds.
2. Two-Stage Test Vehicle M = 25 Payload 0 pounds.
3. Four-Stage Test Vehicle M = 29 Payload 90 pounds.

Satellites

1. Two-Stage Vehicle. Payload 50 pounds. Orbit at 190 mi. altitude.
2. Three-Stage Vehicle. Payload 200 pounds. Orbit at 300 mi. altitude.

These combinations of vehicles are attained by uniting the Thor and the RTV in various stages. A brief study of the interstage connection between Thor and RTV reveals no major modifications needed to make the connection. The spin-rocket system of the RTV is also utillized in those designs (with streamlined fairings). The Thor guidance system is replaced by a simpler, lighter system for these designs. In view of the simplicity of these modifications, it is expected that the development costs involved in the above proposals will ve very nominal.

The performance and payload capabilities of these arrangements seem to justify further consideration of their potential uses. Please let us know if we can be of further assistance in the development of the idea.

9

J. B. Kendrick

JBK:gg

See Transmittal letter 3 May 57

[redacted]

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SUMMARY

1. The present proposal is to assemble multi-stage rocket vehicle using the IRBM "Thor" as first stage or booster, and the T-65 as second stage. The plan appears to be feasible without extensive changes to the booster or to the T-65 (see Figs. 1 and 2). The nose cone of the Thor may be removed and the interstage adaptor attached at Sta. 50. The standard T-65 motor and spin rocket installation as used on the RTV are assumed for the second stage. Some weight saving modifications to the guidance and control equipment aid power supply are assumed, and specified.

2. The payload-velocity-range characteristics of the resulting two-stage vehicle are as follows:

Payload, lbs.	Max. Velocity, ft/sec.	Max. Range, n mi.
0	25,400	-
500	23,300	5,300
1,000	21,500	4,150
2,500	18,700	2,800

3. The bending moment imposed on the interstage connection by the sudden application of 3° motor tip at burnout of Stage 1 is about 500,000 in.lb applied load. This imposes a stress on the booster at Sta. 141 of 2500 psi and on the T-65 motor of 6000 psi. These moderate stresses are higher than any gust load condition would impose, but seem to indicate that the structural problems involved in the proposal would not be critical.

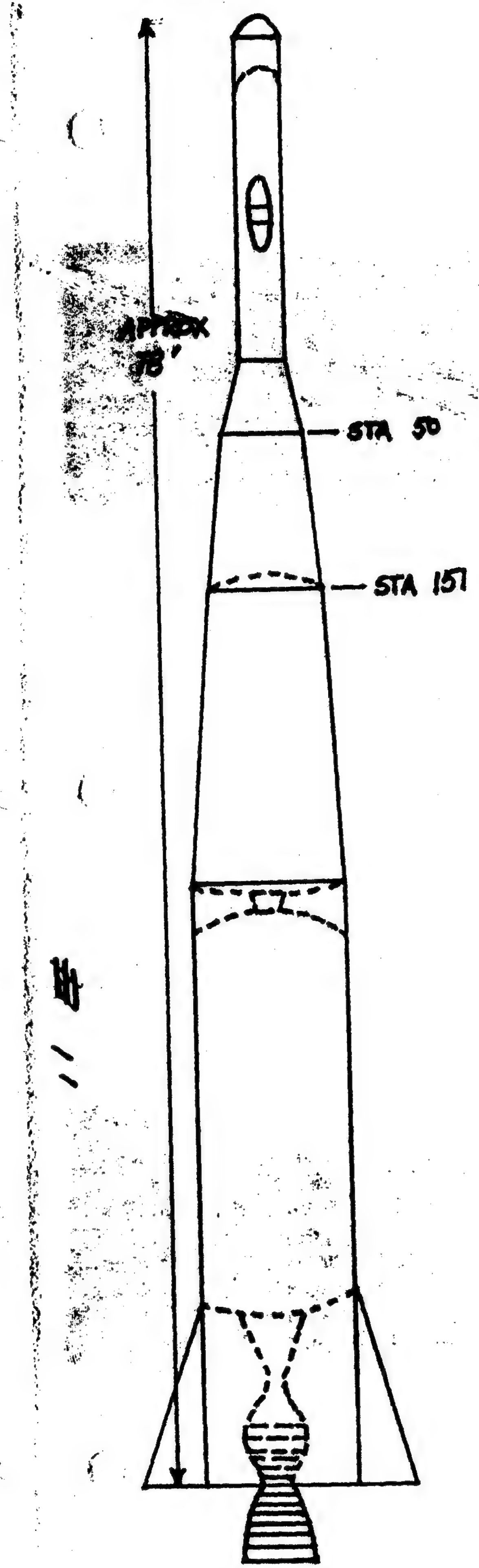
4. Given the IRBM booster and the T-65 motor with spin-up rocket installation as used on the RTV, the cost of assembling the two-stage vehicle is seen to be very nominal. In fact, this is the lowest cost rocket vehicle havin a range of about 5000 miles which has come to the author's attention.

5. In addition to its suggested use as a Re-entry Test Vehicle for tests on a half-size nose cone of the ICBM, many other applications may be devised, such as a weapon, decoy or reconn. vehicle. By virtue of the ease of adaptability from available parts, the latter possibilities should be given further consideration. Some interesting possibilities can also be obtained by use of three-and-four-stage combinations of available parts.

6. A two-stage satellite vehicle capable of orbiting a payload of 50 lbs. can be obtained, by modifications to the Thor guidance, autopilot and power supply, and be use of an 18:1 expansion ratio nozzle on the T-65. With similar modifications, a three-stage satellite capable of carrying a payload of 200 lbs. can be obtained.

7. If a four-stage vehicle is assembled with the IRBM booster and all three stages of the RTV, a Mach number of M = 29 can be attained with a payload of 90 obs. Using the low-thrust attitude-control system after Stage 1 burnout, it is possible to provide re-entry angles of 20 degrees or less with range values of about 2000 miles.

FIGURE 1



PROPOSED TWO-STAGE ROCKET VEHICLE

USING IRBM BOOSTER

WITH T-65 SECOND STAGE

Payload	500 lbs
Maximum Range	5,300 n mi
Stage 1 Burnout Altitude	210,000 ft
Stage 1 Burnout Velocity	12,600 ft/sec
Stage 2 Burnout Altitude	400,000 ft
Stage 2 Burnout Velocity	23,300 ft/sec
Apogee	4×10^6 ft.
Re-entry Angle	20./ degrees from horizontal

Plan of Operation

Fire Stage 1. Climb vertically for 10 seconds, then programmed turn to angle of 20 degrees using programmer and autopilot mounted in Stage 1. Conventional Stage 1 controls with vernier & anti-roll to stage burnout and for 6 seconds thereafter.

Separate and fire spin-up rockets to get 4 revs/sec.

Fire Stage 2, after separation and spin-up initiated by programmer. Spin velocity will maintain constant attitude to about 1 degree.

Separate nose cone by pyrotechnic or mechanical expulsion unit, initiated by time fuze, after burnout of Stage 2.

Nose cone has no attitude control; hence will re-enter at any angle and will tend to oscillate.

Stability, damping, temperatures, pressures and radiation effects can be measured under conditions comparable to ICBM re-entry.

Data can be telemetered to ground stations.

TWO-STAGE TEST VEHICLE PROPOSAL

The present proposal is to assemble a two-stage rocket vehicle using an IRBM as booster, with a standard T-65 motor as the second stage. This two-stage vehicle might be used as a Re-entry Test Vehicle, capable of carrying an ICBM nose cone (one-half size) weighing 500 lbs., with a re-entry Mach number of about M - 23.

The basic Thor vehicle is not changed except to remove the nose cone and replace it with an adaptor which supports the second stage (see Fig. 2). The gross weight of the two-stage vehicle is about 5000 lbs. greater than the orignal Thor, but the burnout velocity of Stage 1 is still about 12,600 ft/sec. with the two-stage missile carrying 500 lbs. payload. The original guidance and autopilot system is assumed to be repalaced by a lighter system for such tests.

The flight plan (see Fig. 1) is to use the conventional IRBM controls and anti-roll & verniers through the boost period and for 6 seconds thereafter, then to separate and fire the second stage immediately. The RTV spin rocket system gives 4 revs/sec., which provides stability and attitude control during the second stage burning period. After burnout the nose cone separates and continues on trajectory without attitude control. Its shape is believed to provide sufficient stability to cause it to align itself with the flight direction on re-en Temperature effect and stability characteriestics may be measured and telemetered to the ground.

The ICBM nose cone weighing 3500 lbs. consists of approximately fifty (50) percent warhead and an equal amount of shell and structure. The same deceleration would be obtained on a model in which the drag/weight ratio was held constant. For a half size model, the drag is reduced by a factor of four due to the reduction in size, and the weight should also be reduced by a factor of four, to give the same deceleration. Hence, the weight of the half size model would be 875 lbs., or of a one-third size model 390 lbs. The weight of a scale model varies as the cube of the scale; hence the half size model would weigh 1/8 of 1750 lbs. or 220 lbs., while the 1/3 size model would weigh only 65 lbs. Ample weight is then available for extra skin gage and for telemetering equipment

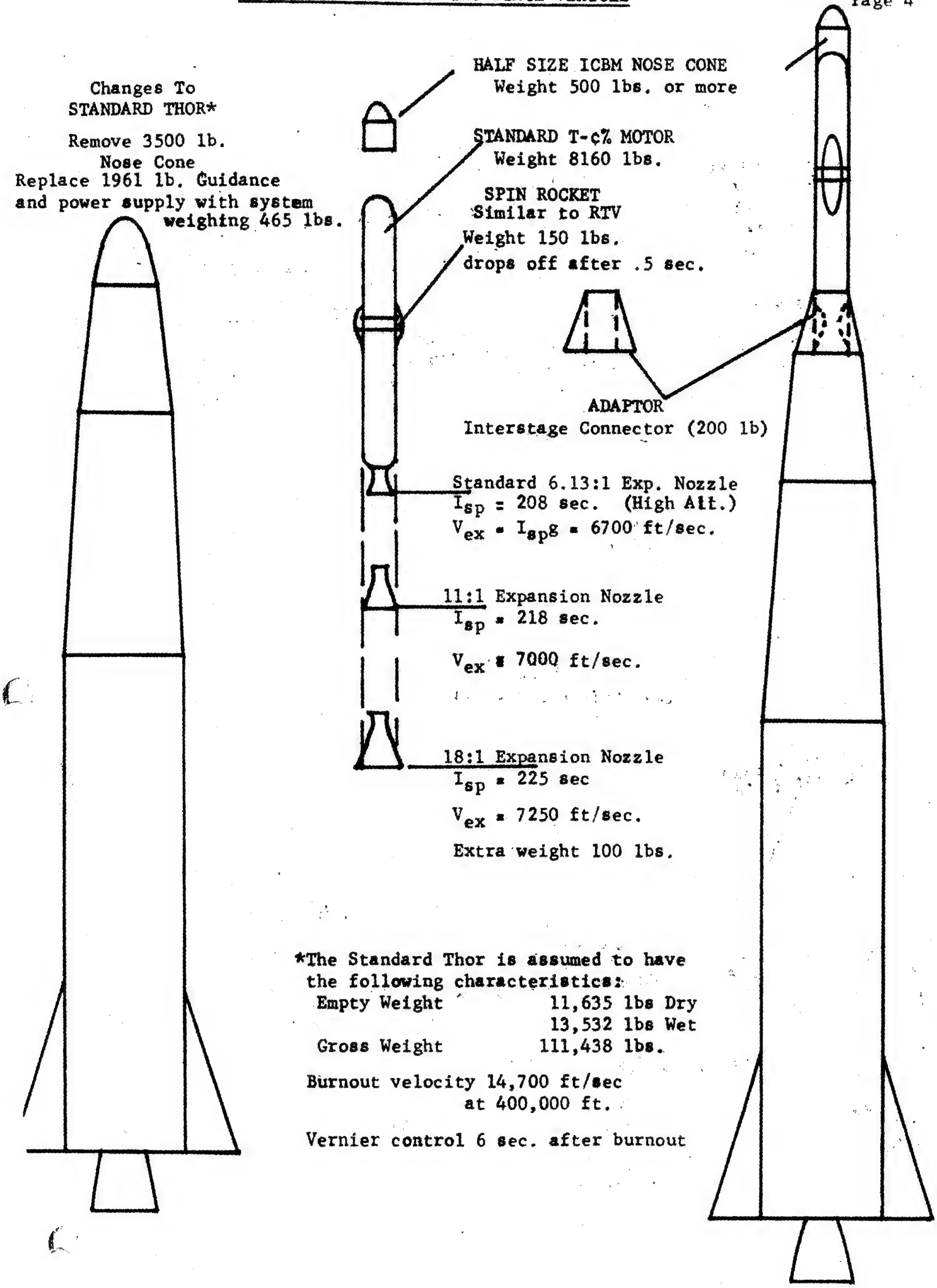
The re-entry angle can be varied from values of the order of 20 degrees corresponding to the ICBM to much higher angles, by adjusting the autopilot programmer during the launch phase. The similitude conditions to be expected for the proposed Re-entry Test Vehicle are as follows:

Similitude Condition	ICBM	Re-entry Test Vehicle 1/2 Size	Re-entry Test Vehicle 1/3 Size
Re-entry Velocity, ft/sec	23,000	23,300	23,300
Re-entry Angle, degrees	18	18 - 90	18 - 90
Reynolds Number	R_o	1/2 R_o	1/3 R_o
Max. Deceleration. "g's"	60	60	60
Heating Period, sec.	t_o	t_o	t_o

IN BUILD-UP OF TWO-STAGE VEHICLE

Changes To
STANDARD THOR*

Remove 3500 lb.
Nose Cone
Replace 1961 lb. Guidance
and power supply with system
weighing 465 lbs.



*The Standard Thor is assumed to have the following characteristics:

Empty Weight	11,635 lbs Dry
	13,532 lbs Wet
Gross Weight	111,438 lbs.

Burnout velocity 14,700 ft/sec
at 400,000 ft.

Vernier control 6 sec. after burnout

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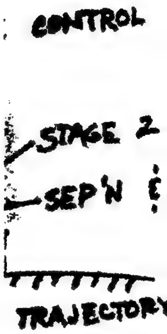


TRAJECTORIES AND GROUND STATIONS

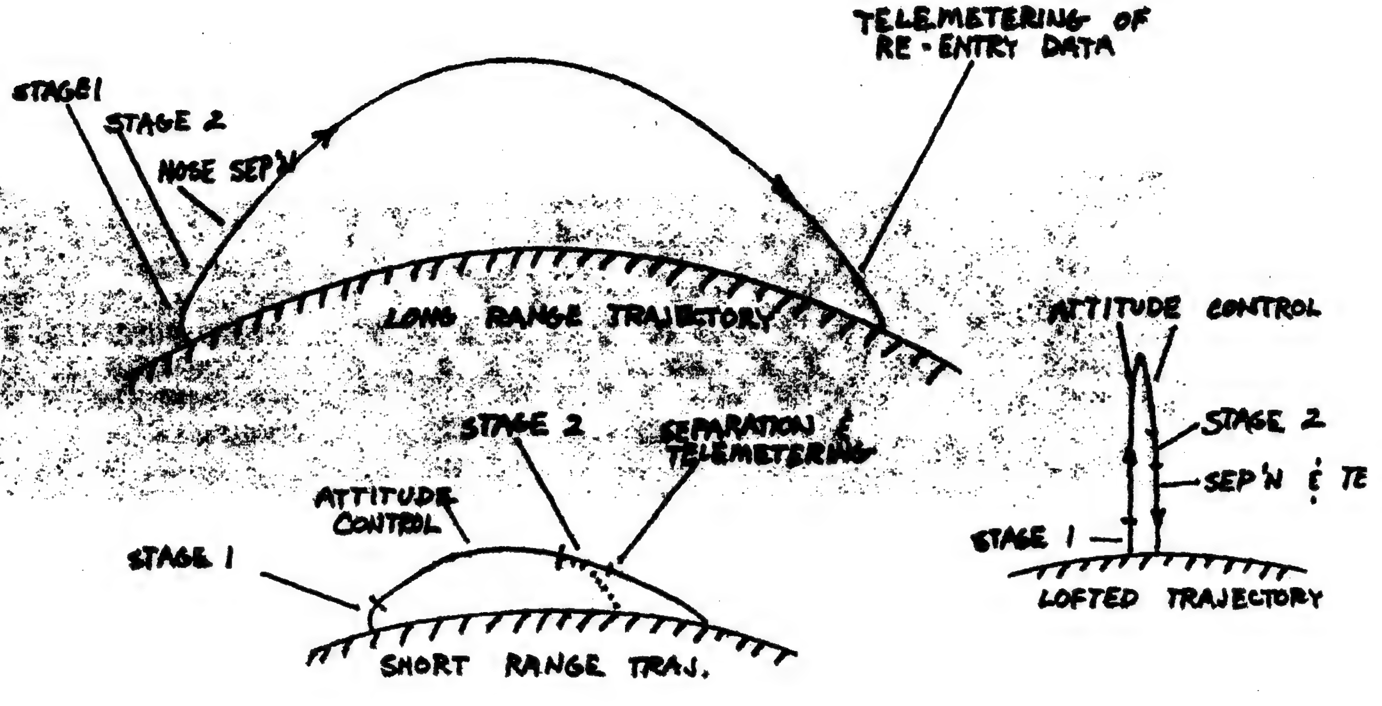
Long Range Trajectories. The two-stage test vehicle can be launched a long range trajectory of about 5300 n. mi. by tipping over to an angle of about 20 degrees near the end of Stage 1 burning period and holding that angle constant during Stage 2 burning period, which is assumed to commence about 6 seconds after Stage 1 burnout. Ground stations for this type of operation may be the same as [illegible] for the ICBM long range trajectories. The two-stage payload is [illegible] to impact within about 100 miles of the aiming point [illegible] its telemetering range during re-entry should be several hundred miles, [illegible] the ICBM ground stations should be within telemetering range [illegible] trajectory.

Short Range Trajectories. In case it is desired to reduce the range of the test vehicle, one effective method is to fire the first stage, then [illegible] to apogee and beyond using low-thrust attitude-control nozzles, then to fire the second stage on the downward leg, at whatever re-entry angle is desired, and at such altitude that burnout will occur above an altitude of 400,000 ft. This procedure will reduce the range to about 2000 miles for 20 degree re-entry angles.

Lofted Trajectories. By firing the first stage nearly vertical, and delaying Stage 2 firing until the downward leg, the range may be reduced to any small value desired. This technique is feasible by use of low-thrust attitude-control nozzles, utilizing the remaining LOX tank gas pressure. Such lofted trajectories will give rather steep re-entry angles, of course, but such may be desired for some tests. The attitude control may work in two ways:

1. Maintain the missile nose up until ready to fire Stage 2. Then separate, spin-up and fire Stage 2, which points downward.
2. Tip the missile over to nose down attitude. Then separate, spin-up and fire Stage 2. (The latter technique requires gyros capable of operation through a range of about 180 degrees change in attitude.)

14



WEIGHT SUMMARY AND PERFORMACE ESTIMATE

TWO-STAGE RE-ENTRY TEST VEHICLE WITH SPIN-UP

Present weight empty of IRBM (Dry)	11,635 lbs.		
Residual Propellant	1,897		
Present weight empty of IRBM (Wet)	13,532 lbs.		
Usable Propellant	97,906		
Gross weight of present IRBM		111,438 lbs.	
Items to be removed		-5,461	
Nose cone	3,500		
Structure forward Sta. 151	382		
A C guidance unit	991		
Autopilot units, supports, batteries	227		
Reduce size of vernier tanks	200		
Items to be added		+465	
Autopilot and programmer	150		
Power supply	115		
Adaptor for T-65	200		
Net weight of Stage 1		106,442 lbs	(0 lb. Pay
Add T-65 and 500 lb. Payload Model payload and fitting 500 T-65 with standard nozzle 8160 (including 6978 lbs. propellant) Spin-up rocket installation 150 (drop off after .5 sec)		8,810	8.310
Launch weight of Stage 1		115,252 lbs.	
Less usable propellant		97,906	
Empty weight of Stage 1		17,346 lbs.	16,846
Estimated Burnout Velocity - Stage 1 **	270,000 ft	12,600 ft/sec	12,800
Velocity increment - Stage 2 = $6700^{*}\lg\frac{8660}{1682} - 285 =$		10,700	12,600
Estimated Burnout Velocity - Stage 3		23,300 ft/sec (M = 23.9)	25,400 (M = 26.

$$^{*}I_{sp} = \frac{1,309 \times 10}{6978} \times \frac{1.66}{1.494} = 208; \quad I_{sp} \times g = 6700 \text{ ft/sec.}$$

(Standard 6.13:1 expansion nozzle)

**dv/dw = -.44 ft/sec/lb. See Fig. 4

WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

TWO-STAGE SATELLITE VEHICLE

Present weight empty of IRBM (Dry)		11,635 lbs.	
Residual Propellant		1,897	
Present weight empty of IRBM (Wet)		13,532 lbs.	
Usable Propellant		97, 906	
Gross weight of present IRBM			111,438 lbs.
Items to be removed			-5,461
Nose cone		3,500	
Structure forward Sta. 151		382	
AC guidance unit		991	
Autopilot units, supports, cables		161	
Power converter, supports, batteries		227	
Reduce size of vernier tanks		200	
Items to be added			+485
Autopilot and programmer		150	
Power supply		115	
Adaptor for T-65		200	
Control of attitude - system*.		20	
New weight of booster stage			106,462 lbs.
Add T-65 and Orbiter installation			8,460
Orbiter payload and fittings	50		
T-65 with 18:1 nozzle** (including 6978 lbs propellant)	8260		
Apin-up rocket installation	150		
Launch weight of Stage 1			114,922 lbs.
Less usable propellant			97,906
Empty weight of Stage 1			17,016 lbs.

Estimated Burnout Velocity - Stage 1 12,750 ft/sec@ 275,000 ft 10,750@10^6ft.

Velocity Increment - Stage 2 = $7250^{**} \lg \frac{8310}{1332}$ = 13,250

Earth's Rotational Velocity 1,500

Estimated Burnout Velocity - Stage 2 25,500 ft/sec

Required Orbit Velocity at 10^6ft. (190 mi) 25,400 ft/sec

*Standard vernier system (6 sec. after burnout) continues until altitude is about 350,000 ft. Long duration jetsystem may utilize LOX tank gas to turn body to horizontal and hold it for about five (5) minutes, while coasting to apogee.

$^{**}I_{sp} = \underline{1.309 \times 10^6} \times \underline{1.790} = 225$; $I_{sp} \times g = 7250$ ft/sec.
(18:1 expansion nozzle)

STRUCTURAL CONSIDERATIONS

(See Figure 3)

Case 1. Consider bending moment on interstage connection due to sharp edge side gust of 60 ft/sec., applied at maximum dynamic pressure condition of $q_{max} = 800$ lbs/sq ft., Altitude = 35000 ft., Velocity = 1500 ft/sec.

Change in angle of attack = 60/1500 = .04 rad.

Side force on nose = C_L qS = 2.0 x 800 x 4.9 x .04
= 315 lbs.

Bending moment at rear of Sgt. = 315 x 300
= 100,000 inch lbs. (applied)

Case 2., Consider bending moment at interstage connection due to suddern application of control on the main motor. One degree tip of main nozzle gives a moment of

$$M_{cg} = \frac{153,000}{57.3} \times 45 = 120,000 \text{ ft lbs/0}$$

Angular acceleration about the center of gravity will be

$$_{cg} = \frac{M}{I} = \frac{120,000}{300,000} = 0.4 \text{ rad/sec}^2\text{/0 (near burnout)}$$

Moment at interstage connection will be

$$M/o = I = \frac{MI^2}{3} = \frac{9000}{3 \times 32} \times 20^2 \times 0.4 = 14,400 \text{ ft lb/o}$$
$$= 172,000 \text{ in lb/o}$$

*Present T-65 is designed for hoisting moment of 505,000 in lb. and hence could take at least 3 degrees of motor tip.

$$\text{Bending stress on Sta. 151; } f = \frac{My}{I} = \frac{500,000 \times 37}{x 37^3 \times .05}$$
$$= 2500 \text{ lbs/sq in}$$

This corresponds to an increase in tank pressure of about 7.5 psi.

$$\text{Bending stress on rear of T-65} = \frac{500,000 \times 15.5}{x 15.5^3 \times .125}$$
$$= 6000 \text{ lbs/sq. in.}$$

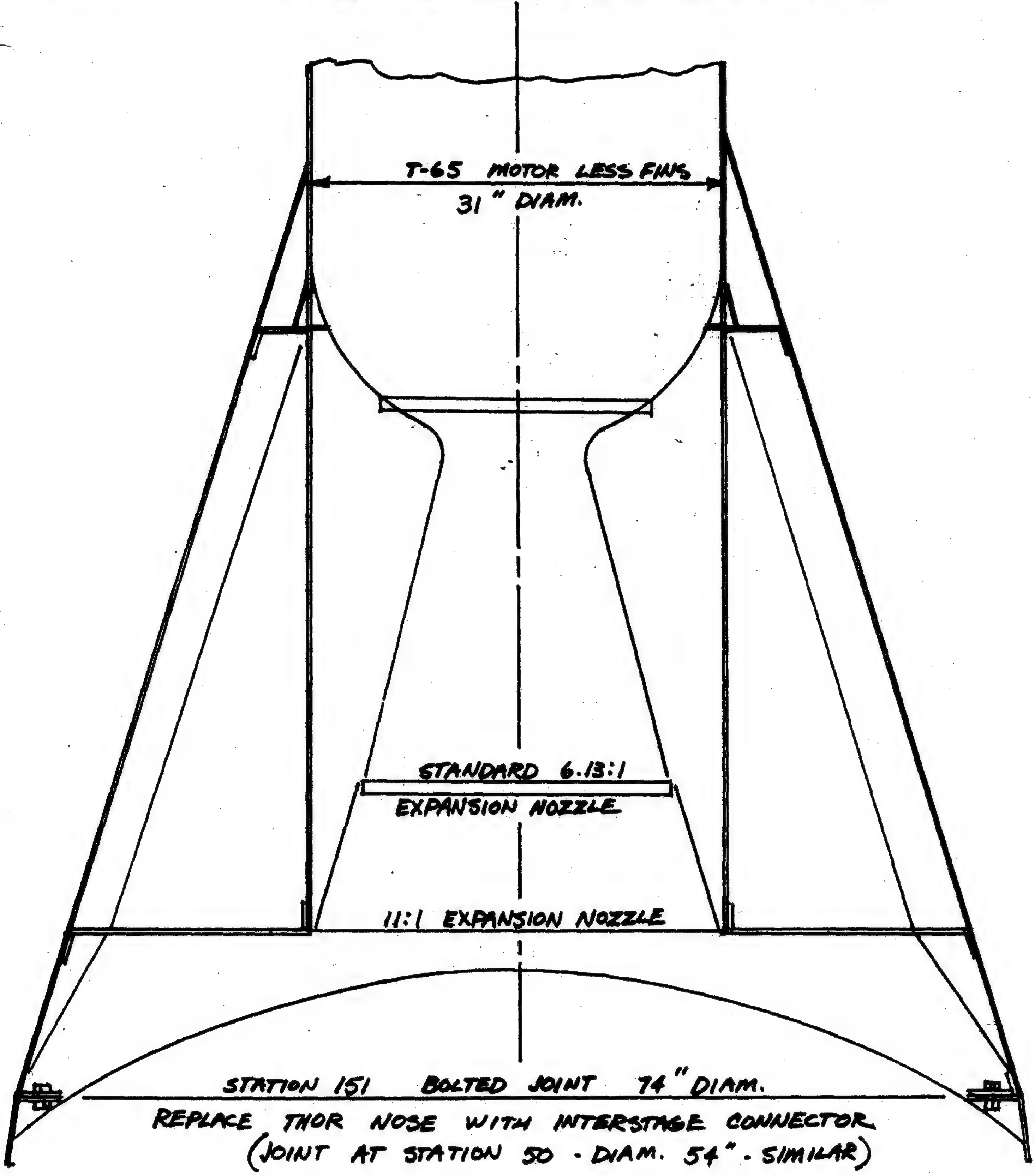
Reaction to resist Bending Moment R = M/d

$$\text{Where } d = 36 \text{ in. } R = \frac{500,000}{36} = 14,000 \text{ lbs.}$$

It is simple to carry this load on two rings of adaptor.

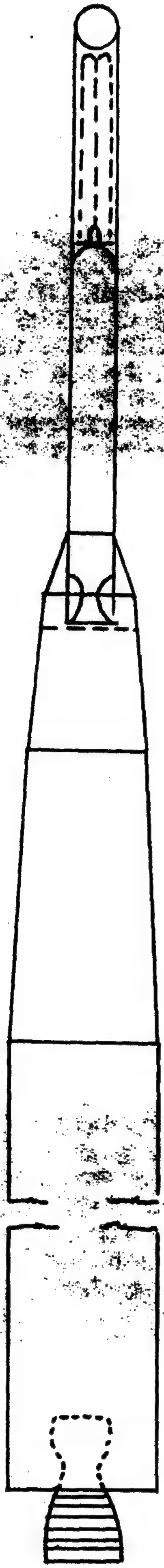
*For further analysis of T-65 load conditions, refer to Thiokol Report SP - 59 "Preliminary Model Spec, Rocket Motor, Solid Prop. T-65, 24-KS-50,000. SP-59". 5 July 55. (Conf.)

FIG 3 INTERSTAGE CONNECTION - T-65 TO THOR



REPLACE THOR NOSE WITH INTERSTAGE CONNECTOR
(JOINT AT STATION 50 - DIAM. 54" - SIMILAR)

SEPARATION OF STAGES: REMAINING GAS IN FUEL TANK MAY BE DUMPED INTO CYLINDER BEHIND T-65



PROPOSED THREE-STAGE SATELLITE VEHICLE USING IRBM BOOSTER WITH TWO STAGES OF RTV

Payload	200 lbs.
Stage 2 and 3 weight	9,980 lbs. including payload
Booster burnout velocity	12,050 ft/sec
Stage 2	9,000
Stage 3	5,700
Earth's Rotation	1500 ft/sec
Total Velocity Stage 3	23,930 ft/sec

Plan of Operation

Fire Stage 1. The vehicle then executes a programmed turn to horizontal at apogee, using autopilot. Conventional controls to burnout, with low-thrust vernier to apogee for attitude control.

Separation, Spin-up and Stage 2 Ignition. The second stage is ejected using pyrotechnic or mechanical ejector unit, initiated by programmer on Stage 1. Motion of separation causes spin-up rocket ignition. Stage 2 motor ignition, and initiation of time fuze for Stage 3 ignition.

Stage 3 Ignition. After time fuze ignites Stage 3 it is launched through guide rails attached to empty Stage 2, thus minimizing its dispersion.

Payload Separation. Depending on the purpose of the flight, payload may or may not be separated from its empty rocket case.

WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

THREE-STAGE SATELLITE VEHICLE WITH SPIN-UP

Present weight empty of IRBM (Dry)	**11,635 lbs.**	
Residual Propellant	**1,897**	
Present weight empty of IRBM (Wet)	**13,532 lbs.**	
Usable Propellant	**97,906**	
Gross weight of present IRBM		**111,438 lbs.**
Items to be removed - Same as p. 7		**-5,461**
Items to be added - Same as p. 7		**-485**
Net weight of Stage 1		106,462
Weight of Stage 2		9,980
Satellite Payload	200	
Three Recruit Cluster (including 3 x 263 lbs. propellant)	1,270	1470 Gross Wt. Stage 3
T-65 motor with 18:1 nozzle (including 6978 lbs. propellant)	8,260	
Spin-up rocket installation	150	
Launcher for Stage 3	100	
Launch weight of Stage 1		116,442 lbs.
Less usable propellant		97,906
Empty weight of Stage L		18,536 lbs.
Estimated Burnout Velocity - Stage 1	12,050 ft/sec@255,000ft	7,730 @ 300 mi
Velocity increment Stage 2 $= 7250 \lg \frac{9830}{2852} =$		9,000
Velocity increment Stage 3 $= 7400 \lg \frac{1470}{680} =$		5,700
Earth's rotational velocity		**1,500**
Estimated Burnout Velocity - Stage 3		**23,930 ft/sec**

Velocity required to orbit at 300 mile altitude 23,900 ft/sec.

DISPERSION OF STAGE 2

Deviation from direction of launch $= \phi = \frac{M}{Aw^2} \frac{\sin a\,wt - a \sin wt}{1 - a}$

where M = unbalanced moment - ft. lbs. (various causes)

A = polar moment of inertia about longitudinal axis - slug ft^2

B = moment of inertia about lateral axis thru cg.

$a = \frac{A}{B}$

w = spin frequency in rad/sec.

Cause 1 = Malalignment of thrust axis 1/4 degree = .0044 rad.

So M = 50,000 x .0044 x 12' = 2640 ft. lbs.

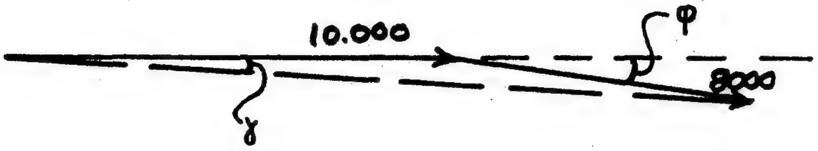
$A = 2 \times \frac{10,000}{32.2} \times 1$ = 620 slug ft^2 to 120 slug ft^2 (at burnout)

$B = \frac{10,000}{32.2} \times 25^2$ = 195,000 slug ft^2 to 39000 slug ft^2

a = .0032 .0032

w = 2π x 4 - 25 rad/sec using spin-up rockets.

Then $\phi = \frac{2640}{620 \times 25^2}$ = .0068 rad. = .39° .034 rad.



Dispersion angle $= .034 \frac{8000}{18,000} = .0152$ rad. = 0.87°

Cause 2 - Unbalanced mass distribution; i.e. dynamic unblance. The empty motor can be balanced to the order of 10^{-6} rad.

The loaded motor can also be balance to the order of 10^{-6} rad.

This cause of dispersion is thus seen to be several orders of magnitude less that Cause 1 above.

Cause 3 - Tip-off from booster. The attitude of the booster is assumed to be held accurately to .001 rad. * Ejection of Stage 2 and spin-up in 0.5 sec. are expected to increase this value to .002 radian; i.e. 45% of Cause 1.

Conclusion: $\Sigma y_i = \sqrt{y_1^2 + y_2^2 + y_3^3 + \dots\dots y_i^2}$ is believed to be of th

order of 1 degree for Stage 2.

*Such guidance accuracy may require heavier equipment than assumed in the weight summary.

DISPERSION OF STAGE 3

Cause 1 - Difference in ignition timing for three (3) rockets. It may be assumed that all 3 rockets ignite, but one of them ignites .005 sec. before the others, thus giving an increment of thrust (say 1/3 of 37,000 lbs) for .004 sec. at moment arm of 3 inches.

$$M \doteq M\frac{\Delta t}{t} = \frac{37{,}000}{} \times \frac{.005}{1.53} \times \frac{1''}{4} = 30.\ \text{ft. lb.}$$

$$A = \frac{2 \times 1770}{32.2} \times 4^2 = 17.5\ \text{slug ft}^2 \text{ to } 8.0\ \text{slug ft}^2$$

$$B = \frac{1770}{32.2} \times 8^2 = 3500\ \text{slug ft}^2 \text{ to } 1700$$

$a =$ .005 .005

$$\phi_1 = \frac{30 \times}{8 \times 25^2} - .0048\ \text{rad.}$$

$$\gamma_1 = .0048\ \frac{5200}{23{,}000} = .0011\ \text{rad.}$$

Cause 2 - 2% difference in thrust of one of three motors

$$M = .02 \times 37{,}000 \times \frac{1}{4} = 185\ \text{ft. lb.}$$

$$\gamma_2 = .0011 \times \frac{185}{30} = .0068\ \text{rad.}$$

Cause 3 - Malalignment of thrust line of one motor $1/4^\circ = .0044$ rad.

$$M = 37{,}000 \times .0044 \times 6 = 980\ \text{ft. lb.}$$

$$\gamma_3 = .0011 \times \frac{980}{30} = 0.035\ \text{rad.} = 2^\circ \text{ (Probably less)}$$

Conclusion: $\Sigma Y_1 = \sqrt{(Y_1^2)_1 + (Y_1^2)_2 + (Y_1^2)_3}$ is believed to be of the order of 2 to 3 degrees, according to the above analysis. This will vary as $1/w^2$; hence a slight increase in spin rate would be desirable.

WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

FOUR-STAGE VEHICLE WITH IRBM AND RTV

Present weight empty of IRBM (Dry)	11,635 lbs.	
Residual Propellant	1,897	
Present weight empty of IRBM (Wet)	13,532	
Usable Propellant	97,906	
Gross weight of present IRBM		111,438 lbs.
Items to be removed - Same as p. 7		-5,461
Items to be added - Same as p. 7 -		-485
Net weight of Stage 1		106,462 lbs.
Weight of Stage 2		10,500
RTV 1st Stage 10,500 lbs (less fins) including 6978 lbs propellant plus spin-up rockets 150 lbs. which drop off after .5 sec.		
RTV 2d Stage 1770 lbs. including 3 x 263 lbs propellant		
Launch Weight of Stage 1		116,962 lbs.
Less usable propellant in Stage 1		97,906
Empty weight of Stage 1		19,056 lbs.
Estimated Burnout Velocity of Stage 1		11,800 ft/sec
Velocity increment Stage 2 = 7250 log $\frac{10,350}{3,372}$ - 285 =		7,800
Velocity increment Stage 3 = 7400 log $\frac{1,770}{980}$ =		4,400
Velocity increment Stage 4 = 7400 log $\frac{500}{240}$ =		5,400
Estimated Burnout Velocity - Stage 4		29,400 ft/sec

APPENDIX

METHOD OF COMPUTING PERFORMANCE

The performance of Stage 1 was computed on the 1103 Computer in the same detailed manner as for the IRBM. Four values of burnout weight were used; i.e., the nominal weight of the standard missile and three higher values. Burnout velocity and altitude is plotted in Fig. 4 as a function of burnout weight for the case of 97,906 pounds of usable propellant.

For later stages, the velocity increment is shown in Fig. 5 as a function of mass ratio for various vlues of effective exhaust velocity. The effect of gravity and drag for Stage 2 operation in a long range trajectory was computed on the 1103 Computer, and found to be 285 ft/sec. The velocity increments determined from the chart should therefore be decreased slightly for gravity and drag.

Range as a function of burnout velocity is shown in Fig. 6 for the IRBM family of missiles. The four points computed on the 1103 Computer are distinguished by asterisks.

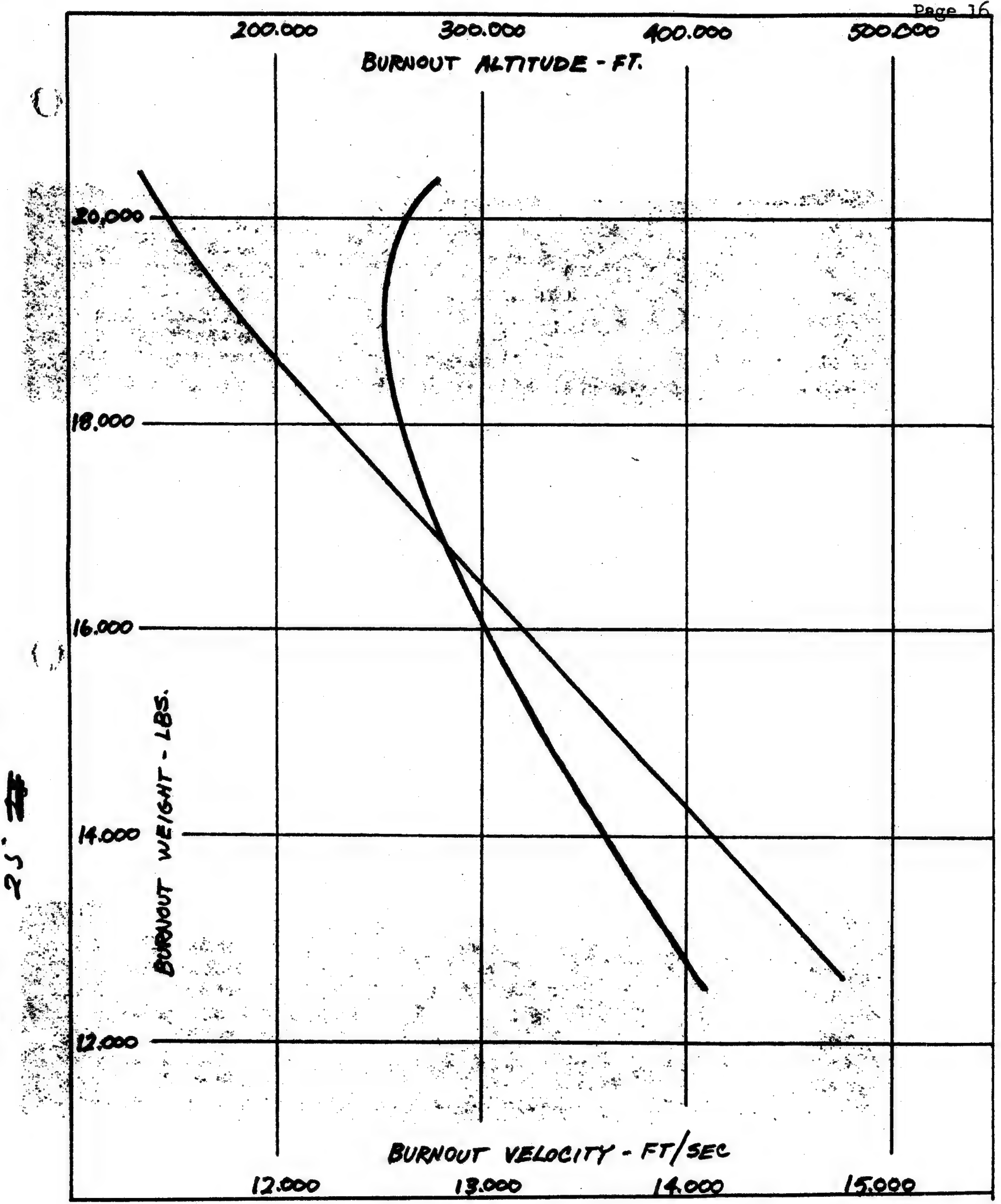
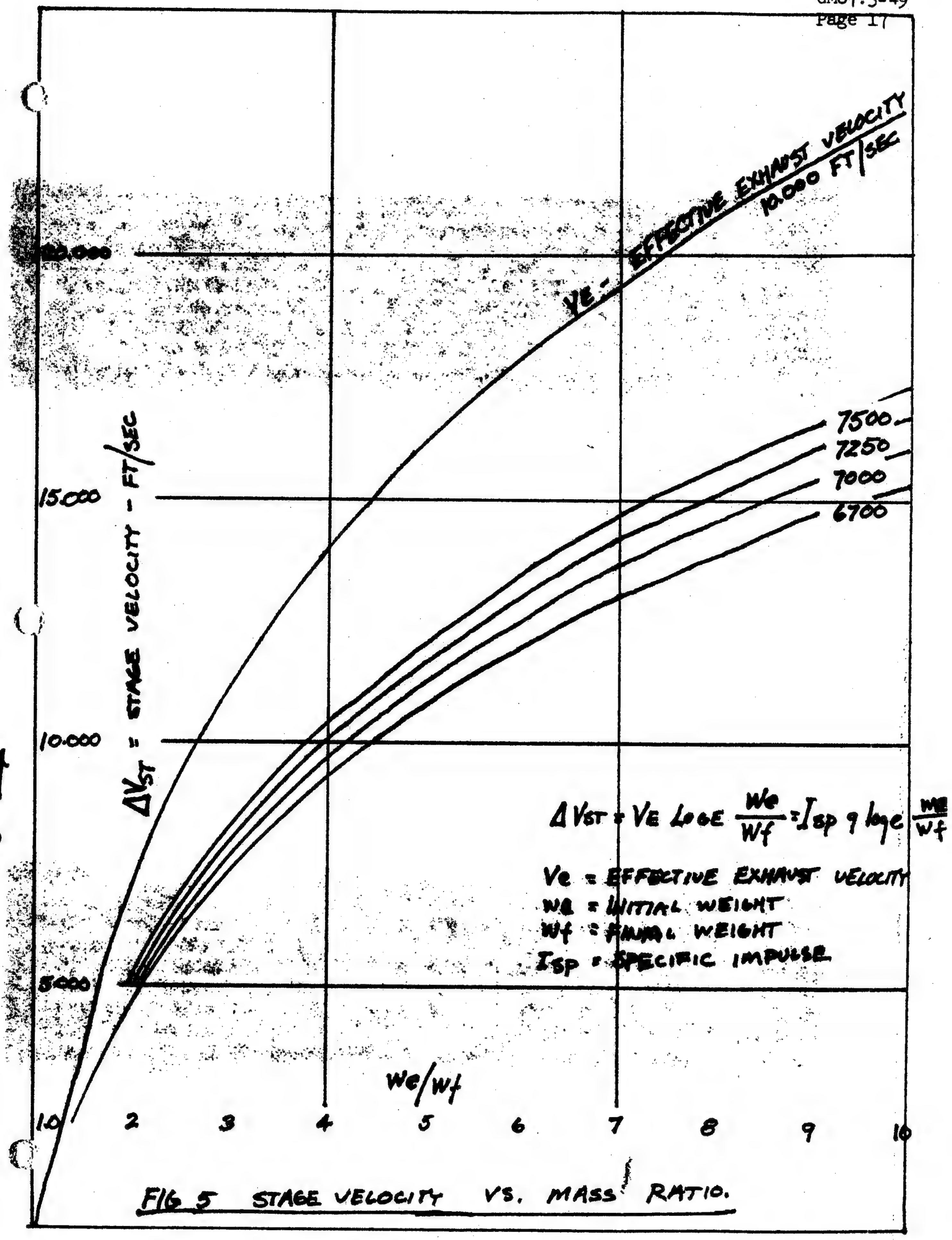


FIG. 4 BURNOUT VELOCITY AND ALTITUDE VS WEIGHT FOR STAGE 1



$$\Delta V_{ST} = V_E \log_E \frac{W_e}{W_f} = I_{sp}\, g \log_e \frac{W_e}{W_f}$$

Ve = EFFECTIVE EXHAUST VELOCITY
We = INITIAL WEIGHT
Wf = FINAL WEIGHT
Isp = SPECIFIC IMPULSE

FIG 5 STAGE VELOCITY VS. MASS RATIO.

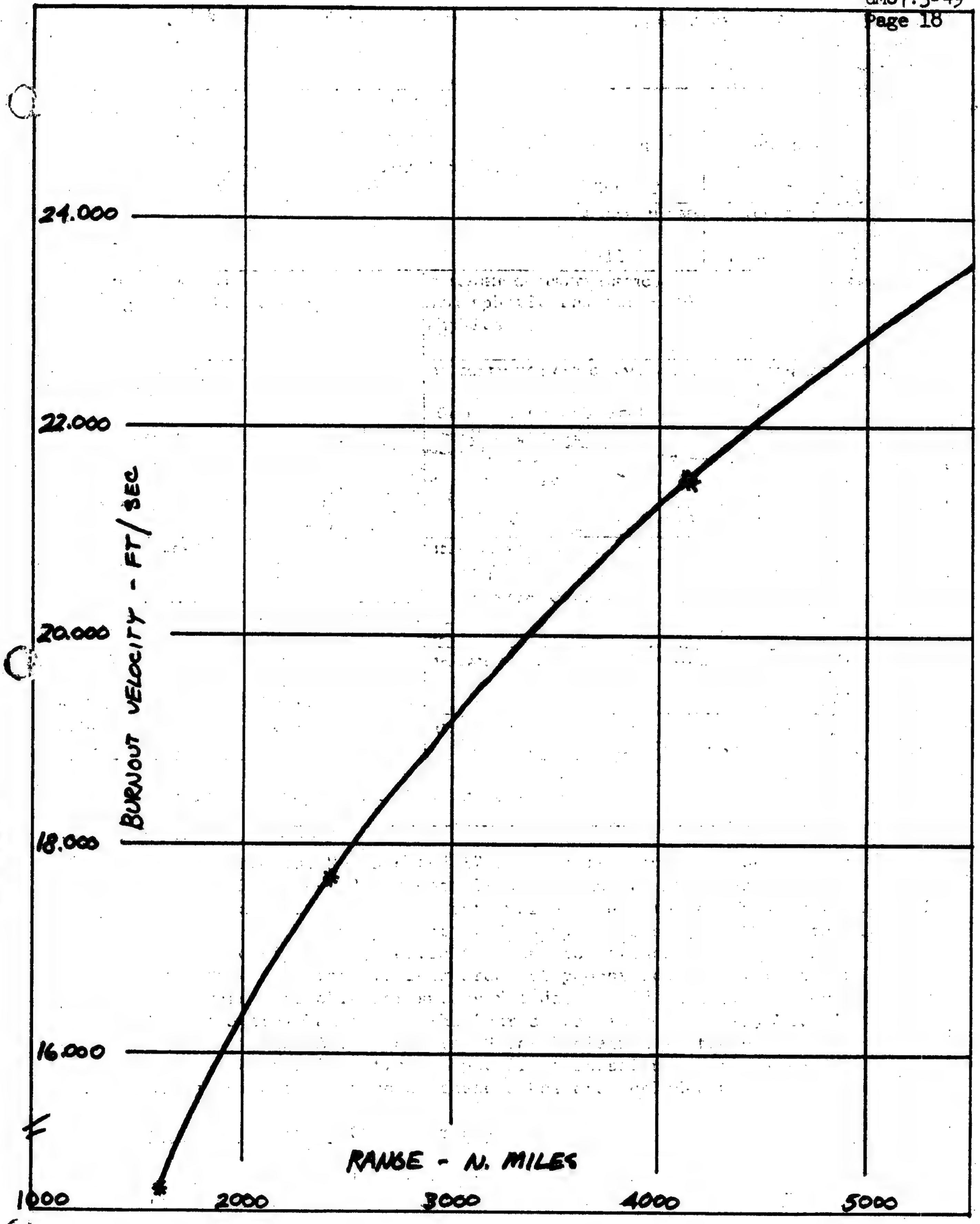


FIG. 6 RANGE VS. BURNOUT VELOCITY

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AF-WP-L-29 MAY 53 5M [redacted]

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RDB PROJECT CARD

TYPE OF REPORT New Project		**REPORTS CONTROL SYMBOL** DD-RDB(A)48
1. PROJECT TITLE (UNCLASSIFIED TITLE) Geophysical Environment Data for ARS, WS117L Short Title: ARS Environment	**2. SECURITY** SECRET	**3. PROJECT NUMBER** 1764
	4. INDEX NUMBER 2-117L	**5. REPORT DATE** 2 April 1957

6. BASIC FIELD OR SUBJECT Strategic Air Warfare System 117L	**7. SUBFIELD OR SUBJECT SUBGROUP** Atmospheric Physics - 7B Physics	**7A. TECH. OBJ.** SA-9A, 9B, 10 IO-9

8. COGNIZANT AGENCY ARDC	**12. CONTRACTOR AND/OR LABORATORY** Geophysics Research Directorate See 21c	**CONTRACT/W.O. NO.** - See 21C
9. DIRECTING AGENCY GRD, AFCRC		
OFFICE SYMBOL CRZA / **TELEPHONE NO.** Hu 2-7730 X-9		

INFORMATION COPY

10. REQUESTING AGENCY HQ, USAF	**13. RELATED PROJECTS** WS 117L	**17. EST. COMPL. DATES** RES. 1957 DEV. 1958 TEST 1959 OP. EVAL.

11. PARTICIPATION, COORDINATION, INTEREST

USAF	USN
AMC-P ATIC-I	CNO-I
SAC-I	USA
ADC-I	C/S-I
APGC-I	Other
ATC-I	CIA-I

14. DATE APPROVED

15. PRIORITY 1A

16. A(Missiles)

18. FY	FISCAL ESTS. (M $)
Prev	160M
FY57	422M
FY58	1000M
FY59	1410M
FY60	425M
Total	3417M

19.
This is the initial report on this project

20. REQUIREMENT AND/OR JUSTIFICATION

System Requirement No. 5 dated 17 October 1955 and subsequent letter directive from WDD dated 23 December 1955 assigned to AFCRC the responsibility for providing environmental data which affect the design and testing of ARS vehicles. Based on independent studies by the Geophysic Research Directorate the three design study contractors and conferences with personnel of the WSPO, it was concluded that in four areas of geophysical environment insufficient data were available for successful design and test of the Advanced Reconnaissance System Vehicles. The four so considered are (a) Meteor Physics (b) Density at Orbital Altitudes, (c) Solar Radiation in the U.V. and X-ray Region and (d) Thermal Radiation. Specific discussions of requirements for additional design data in each of these areas are included under each task.

21 a. Brief and Military Characteristics

The objective of this project is to provide environmental data considered essential to insure and simplify the design of a successful Advanced Reconnaissance System.

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22. RDB [redacted]	IC & P	X.	I.	C.

DD FORM 613 [redacted]

PAGE 1 OF PAGES

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(UNCLASSIFIED TITLE) Geophysical Environment Data for ARS, WS 117L   2 April 19
Short Title: ARS Environment   Proj 1764

21 b. Approach

See individual Tasks. (21c)

21 c. Tasks

1. (a) T-39791 - Solar Radiation Program in Ultraviolet and X-ray Region for ARS

(b) This task will be accomplished through a combination of "in-house" and contractual effort. Currently the contractual effort is by Comstock and Westcott, Inc., under Contract AF 19(604)-1889. Other contractors contemplated at the moment are: University of Chicago, Chicago, Ill. and Radio Corporation of America, New York, N. Y.

(c) Task objective is to determine the intensity of Solar U.V. and Soft X-ray radiation as it would strike the satellite and the extent of damage due to collisions of molecules, atoms and ions with the satellite surface.

Requirement and/or Justification

Vehicle design will be affected by radiation in the solar ultraviolet and X-ray region. It has been shown by GRD that the quantum yield of photoelectric effect on metals exposed to short wavelength ultraviolet is about 250 times as great as that of the conventional photoelectric effect in the visible an near UV. Thus, since a vehicle traveling at 500 km is essentially receiving unfiltered solar radiation of low wavelength, one must consider a possible "charging-up" of the metal due to the loss of photoelectrons from the surface. This charge can theoretically rise to a high voltage, depending on the wavelength and intensity distribution of the incident radiation. Such a charging-up could influence the telemetering or other electronic functions of the equipment in the vehicle. Also, it is known that short wavelength ultraviolet causes deterioration of a plastic surface. This could fog plexiglass and damage rubber-like materials. Present data are inadequate to evaluate this effect simply because we do not know within several factors of ten the solar intensity above the atmosphere at wavelengths below 1500 Angstrom Units and we believe that design purposes can therefore not be satisfied.

The effect of atmospheric composition at 500 km is difficult to assess. There might be heating of the vehicle to contend with, due to recombination of atoms on the surface as well as impacts with other atoms and molecules. Such a heating effect would be super-imposed on that due to solar radiation and would act even at night when the vehicle is shielded from the sun by the earth. Since solar ultraviolet and X-ray radiation is part of the total picture of the integrated interaction of the sun and the earth's atmosphere and data of this kind are extremely scarce the measurements of these variables at vehicle altitude would be unique. These measurements would give us information as to the physical mechanisms operating in the ionosphere and delimit in an essential fashion the ionospheric functioning by giving us a better understanding of the nature of atmospheric ionization. This would assist in the forecasting of ionospheric propagation and could contribute toward the solution of the satellite communications problem.

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(d) Approach

At the present time, there are two main areas of research:

(1) A laboratory investigation of the effect of collisions of particles, atoms, molecules and ions on solid surfaces (sputtering) conjoined wit the effect of recombination of atomic species on solid surfaces.

This laboratory study will be carried on mainly in-house, but with modest contract let for auxiliary studies.

Primary in this research will be the problem of developing ultra high vacuum mass spectrometer tubes for study of the effect of ion bombardment of surfaces. Such a tube would require suitable component parts, valve sealants, tubing and pumps to obtain this vacuum. This is necessary to duplicate in the laboratory pressures at satellite altitudes. The feasibility of this development has already been established by in-house work. About half of this is finished, leaving principally design engineering.

Different techniques, among them molecular beams, will be used for the acceleration of the non-charged particles on receiving test plates the nature of which will be determined by vehicle design. In particular, the effect on metals will be examined. The plates will be tested by a variety techniques, microscopes, etc., for possible damage due to momentum transport (sputtering).

(2) Solar ultraviolet and X-ray study -- The goal set in this research is the measurement of absolute intensities of the solar spectrum from 1500 Angstroms down to a few Angstroms. This program is divided into three phases, laboratory investigations, measurements of solar intensities in rockets and finally, construction of the satellite instrumentation by miniaturization of rocket instrumentation.

This region of the spectrum is relatively unexplored; hence, a whole new system of monochromators, sources and detectors must be constructed. First, there must be the calibration against a primary detector, thermocouple not calorimetric. These secondary detectors must be reliable and reproducible. In type, they may be dependent upon the interaction of radiation with a filling gas or on the effect of radiation upon a cathode. Therefore, laboratory work will be needed to select adequate detectors.

The monochromators to be constructed are unique in design and rather elaborate in the equipment necessary to perform the desired calibration. They have already been designed and are presently under construction. To put them into actual operation will take an extensive period of working-out of the manifold details and problems involved.

The construction of detectors will be to a large extent under contract.

[redacted]

[redacted]

Because the interaction of matter with radiation in this region is as yet little understood, the objectives can only be reached by an extensive deepening of our insights into the nature of these processes. For example, a predicted phenomena is that of photoconductivity effect. This, when more fully investigated, may yield a possible secondary type of detector.

The process of building suitable detectors can only go on simulateneously with this type of exploratory research. After the laboratory phase, the instruments will be flown in Aerobee-Hi rockets to measure the radiation intensity above the earth's atmosphere. The number of flights necessary will be at least six, possibly increasing to eight or nine depending on results.

2. (a) T-39792 Interplanetary Matter and Meteor Physics in Relation to ARS

(b) This task will be accomplished through a combination of "in-house" and contractual effort. Currently the following contracts are in effect:

(1) - AF 19(604)-1894 - Temple University
(2) - AF 19(604)-1908 - Oklahoma A and M
(3) - AF 19(604)-1901 - Smithsonian Observatory
(4) - AF 19(604)-1892 - Stanford Research Inst.

No other contracts are contemplated at the moment.

(c) The objective of this task is to determine the possible hazard from meteoric bombardments to a vehicle above the earth's atmosphere and to provide data as to the spatial distribution, size, composition, and velocity of micrometeoric matter.

Requirement and/or Justification

The hazard from meteoric collision with a body essentially in interplanetary space, unprotected by the earth's atmosphere is not very well known. The probability of collisions intense enough to destroy the vehicle or affect its operation is very important in the design of a protective "meteor bumper" to insure proper operation of the vehicle. These meteoric collisions may result in dangerous surface erosions affecting heat exchange properties and optical windows. Stability, temperature control, reliability may all be influenced by meteoric bombardment.

Information regarding the influx of meteoric material into the earth's atmosphere has been collected by the following methods: visual observations, photography, radio reflections from meteor trails, and telescopic observations. From such studies and measurements, the diurnal and seasonal variations in the influx of sporadic meteors, velocities and radiants of shower meteors, velocity distribution of sporadic meteors, mass distribution of meteors, and spatial density of meteors have been determined. These measurements give a value for the rate of influx of interplanetary material into the earth's

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atmosphere of 5×10^6 gm per day. However, these ground-based methods are limited and a grave anomaly, of importance to the ARS, exists. Since the visual and photographic methods are only sensitive to meteors of visual magnitude +5 (10^{-2} grams mass, 10^{11} ergs energy) and the radio and telescope methods to visual magnitude of the order of +8 (mass x 10^{-4} gm, energy 6×10^9 ergs), information derived from these methods regarding meteoric particles with mass less than 10^{-4} gm is seriously lacking. These smaller particles are far more numerous and therefore have a high probability of encountering a vehicle above the earth's atmosphere.

The anomaly on the influx of interplanetary matter arises from various indirect measurements of the fine interplanetary matter. These measurements include determination of the density of matter in the zodiacal cloud, or the interplanetary dust cloud, by S. C. Van de Hulst and C. W. Allen; measurements of the nickel content in deep sea ocean sediments by H. Pettersson and H. Rotsch; and initial rocket soundings from V-2 and Aerobee rockets. These measurements indicate a rate of accretion of interplanetary matter by the earth as high as 5×10^{10} gm per day, up to a factor of 10^4 times higher than predicted from regular methods of observation. It seems, also, that this high rate of influx may be necessary to explain the presence of the E region ionization during the night. This higher rate leads to a probably encounter for visual magnitude 15 (energy 10^{10} Bev) of one hit per square meter per second. Such impact rates are significant for a vehicle with a required lifetime of about a year. These impact rates may possibly be further increased by a factor as great as 10^4 to 10^6 if geomagnetic focusing of cosmic dust particles, suggested also by S. F. Singer, was detected experimentally.

From the standpoint of ARS, the hazard to space vehicles in an interplanetary environment seems closely dependent upon the effects of interplanetary matter, as well as such other factors as cosmic radiation, atmospheric drag, and energetic solar radiation. On the one hand, relatively large impacts may result in penetration of the vehicle surface and subsequent destruction of important equipment, affecting the usefulness of the vehicle, while smaller impacts would result in an abrasion affecting the usefulness of lenses and photosensitive surface areas, etc.

It is therefore necessary to determine the probability of collisions with interplanetary particles as a function to time, and the effect of the individual collisions on the vehicle in order to determine design criteria for ARS. These requirements may be fulfilled by a measurement program involving high altitude rockets and satellite type vehicles, and direct laboratory studies of high speed impact interactions. Related studies that would support direct probing methods are also of interest in order to afford a higher degree of validity to the experimental results.

(d) Approach

The areas of investigation in this task may be broadly divided into rocket and satellite experiments and laboratory studies.

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(1) Determination of the influx of meteoric material by rocket experiments

This includes the design and construction of equipment and launching of rockets containing this equipment for the detection of meteoric material. The equipment for detecting meteoric material will operate on the principle of detecting the vibrational energy generated upon impact. This apparatus includes piezoelectric accelerometer, an amplifier, and a telemetering system with its associated ground-based receiver-recorder. Aero bee and/or Nike-Cajun rockets will be used to carry out the program. It is important that a statistically valid sample of meteoric material be obtained for final design of the ARS.

The program of research for direct rocket probing of interplanetary matter involves first the design and development of a basic piezoelectric accelerometer capable of measuring the spatial distribution and mass of interplanetary particles. Such equipment has been used by Prof. Bohn in 1949 and was used again during 1955. Hence, only minor developement and calibration methods are required prior to construction of the basic unit. Such equipment is sensitive enough to detect particles of visual magnitude 25. Approximately ten to twenty detection units will be built on a semi-mass production basis. Approximately five to ten successful experimental firings from Holloman Air Force Base using Aerobee rockets are required prior to establishing a weighted statistical figure for the intensity and probability of a particle impact with a vehicle. About five successful firings at a high latitude would be required to establish the extent of a latitude dependence particularly by small meteoric particles.

(2) Design and development of equipment for detection of meteoric material for inclusion in the ARS.

It is expected that development work in the rocket phase of detection of meteoric material will aid greatly in the development of equipment of a similar nature to be included in the early oribiting and non-orbiting ARS test vehicles. It is important that the apparatus be designed with a high degree of reliability, yet be lightweight, and have a low power requirement.

(3) Theoretical and laboratory studies and high speed impact phenomena

Essential to the measurement of interplanetary matter is a knowledge of the relation of the intensity and frequency distribution of the accoustical energy generated by high speed meteoric impacts to the mass, the mass density, and the velocity of collision with the meteoric particle. Thereby, the surface erosion and the distribution function of meteoric material in space may be determined from the ARS measurements. Polished plate experiments on rockets that may be recovered will yield some information, but high speed impact measurements in the laboratory for the study of collisions of solids with gases and surfaces are required to support this subtask. In addition, optical and radio measurements of meteor influx and atmospheric interactions will also assist in the direct experimental studies.

[redacted]

High speed impact studies of particles with surfaces are possible at this time only by a method using shaped charges, since only by this means have particle velocities comparable with meteor velocities been generated in a laboratory basis. The physics of high speed interactions is not well understood, and experimental measurements at velocities up to 50 km/sec are highly desirable. Even then, it is difficult to predict the degree of success of this technique, but this approach is presently available at relatively low cost. Because the energy density of the impacting reactions may be as much as a hundred times greater than previously observed, considerably different effects than theoretically predicted are to be expected.

(4) Theoretical studies

This subtask is concerned with the correlation and application of various data applicable to the problem of determining the hazard from interplanetary matter upon ARS. Where possible, information from shock tube studies, radio and optical meteoric studies, investigations of meteoric craters, deep see ocean sediments, microchemical analysis of rare gas constituents, etc., that contribute to the overall problem of the determination of the hazard from interplanetary matter will be considered. In this manner, the reliability of the information derived from the direct experimental program may be further evaluated.

The primary emphasis of the approach of the 4 subtasks, therefore, is the determination of the spatial distribution of interplanetary matter, the size distribution, and the mass density of this material, and thus with suitable laboratory studies to be able to predict the probability that meteoric material may penetrate a given thickness of satellite skin per unit time, and the rate of erosion per unit area for a surface exposed above the earth's atmosphere. An improved understanding of the physics of hypersonic interactions in the velocity range equivalent to an energy of 50 to 1000 electron volts is also of importance.

The rocket program for detection of meteoric particles would require approximately ten successful rocket flights up to altitudes as high as 150 km before sufficient data to make a satisfactory estimate of the rate of influx of interplanetary matter. It should be stressed that ten successful flights corresponds to a total measuring time of about a quarter of an hour above altitudes of 50 km. (Measurements below this altitude would be contaminated by terrestrial material). From considerations of the normal difficulties experienced in past experimental programs using high altitude rockets, probably instrumentation for fifteen rockets will be necessary. The estimated cost of development and construction of this instrument is 60M to 100M based on cost of 5M per instrumentation. The cost of rockets for this work based on 30M for a single Aerobee rocket would be 450M for 15 Aerobees. However, since the meteoric detection equipment may be used on a Nike-Cajun rocket system, also, the overall rocket cost is expected to be much lower than the

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estimate using Aerobee because the Nike-Cajun system when it becomes available would cost less than half as much as an Aerobee. The fund requirements however, are based upon rocket requirements using Aerobees.

Upon availability of an ARS vehicle as a platform for the measurement of meteoric particles, a relatively large sampling time for making measurements of interplanetary matter will be available. It is therefore of importance that meteoric detection equipment be mounted on such an early test vehicle. Such equipment must be very reliable and capable of operation over a long period of time, while its weight should be kept to a minimum. The development of equipment for the ARS is estimated to cost 50M over a two-year period, while flight and rocket testing would involve an additional 40M.

The program on research on high speed impact phenomena will be based on studies using shaped charges, and also investigations of dynamic interactions of meteoroids in the atmosphere. The estimated cost of the initial phase of this work is 80M over a two-year period.

3. (a) T-39793 - Atmospheric Density Determination at Altitudes of Artifical Earth Satellites.

(b) This task will be accomplished through a combination of "in-house" and contractual effort. Current contracts in effect are as follows:

(1) AF 19(604)-1871 - University of Michigan
(2) AF 19(604)-1890 - University of Michigan

(c) The objective of this task is to obtain reliable values of atmospheric density, pressure and kinetic temperature between the altitudes of 200 to 400 miles.

Requirement and/or Justification

The primary objective of this task is to obtain reliable values of atmospheric density, pressure and kinetic temperature in the vicinity of 200 to 400 miles altitude, the altitude of a proposed satellite system. These data are needed in solving various problems on the design of the ARS vehicle. Some of these problems are:

1. What altitude must be maintained by a satellite vehicle of specified size and shape in order that the atmospheric drag be sufficiently small to permit a minimum specified life time of the satellite.

2. How does temperature rise on the skin of the satellite vehicle due to aerodynamic heating (friction between itself and the molecules of the atmosphere) vary with altitude below 400 miles altitude.

3. What is the minimum value of mass to cross-section area ratio of a satellite which will permit the required lifetime to be achieved at specific

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orbiting altitudes. The present estimates of the magnitudes of these properties are quite uncertain. Pressure and desnity may be in error by factor of 100 or 1000 at 350 miles altitude because they are based on extrapolation of values at 100 miles and on unconfirmed theories. Extension of measurements to 200 miles or 250 miles altitude would greatly improve the reliability of extrapolation to 300 miles, while measurements at 300 miles would be even better.

The task involves the study and implementation of two basically different methods for obtaining the necessary data. The first method involves the direct measurement of the drag force on a sphere falling from great altitudes after its ejection from a rocket. This method is of special interest since it is the drag force on the satellite which ultimately determines its life Results of this measurement are free from effects of contamination from the rocket. The limitation of this method lies in the fact that the sphere must fall from an altitude of 10 to 20 percent higher than that for which the drag data are desired.

The second method for obtaining these data involves a selective ionization gauge for measuring number density of particular constituents as well as total number density. This method in principle may be used to the peak of rocket trajectory but is adversely affected by contamination from the mother rocket. Various outgassing and ejection techniques under study will minimize this limiation.

A secondary objective of this task is to develop the necessary techniques and devices for measuring pressure, temperature and density from ARS test vehicles. This phase depends in part upon the success of the primary objectives, although the conditions for outgassing are sufficiently different to materially simplify the accomplishment of this objective.

(d) Approach

At this writing, the task appears to involve eight steps.

(1) Feasibility study of two proposed methods for measuring the required parameters.

The feasibility of two methods for the measurement of atmospheric density, pressure and temperature are being explored. These methods are (1) an extension of the falling sphere experiment and (2) the ionization gauge experiment currently being employed up to altitudes of 75 to 100 miles.

The present falling sphere experiment involves the ejection of a sphere from a rocket at high altitudes, and the measurement of the drag force of the atmosphere on the sphere as it moves though space. (It may be ejected anytime after the end of rocket powered flight and hence will rise to a peak slightly lower than that of the rocket.

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The sphere contains an accelerometer which measures drag acceleration as a function of time to 1% accuracy, independent of orientation. The sphere also contains a radio transmitter which relays the accelerometer signal to a ground recorder. The double integration of the total acceleration yields sphere altitude as a function of time to a reasonable accuracy for high angle flights. An independent complicated analytical reiteration method yields sphere velocity and altitude versus time independently. The determination of atmospheric density depends upon a knowledge of drag coefficient at the mach numbers and Reynold's numbers experienced by the sphere. These values of drag coefficient have been measured in ballistic ranges and hypersonic wind tunnels.

The present ionization gauge experiment involves the measurement of ion current from ionized air molecules on one or more chambers on the surface of a rocket. The knowledge of air pressures around conical surfaces with known orientation to the air stream leads to a value of ambient pressure and to temperature if the relative velocity of cone to air is known. This sytem requires some kind of tracking for high accuracy although integration of pressure and temperature values results in approximate altitudes.

Extending the sphere experiment to higher altitudes involves increasing the area to mass ratio of the sphere, shifting the range of the accelerometer to very low values (this essentially eliminates its use at higher accelerations, corresponding to lower altitudes). The system does not work at or near zenith since the velocity is too low (approaching zero for a verital flight) for drag to be measurable.

The extension of the ionization gauge method involves three main steps: (a) Adapting to rocket use existing ionization gauges designed for ver low pressures (Alpert type); (b) eliminating the effect of contamination of the measurement from rocket outgassing by housing the gauges in a separate thoroughly outgassed body which will be spring ejected from an evacuated cavity at high altitude; (c) Eliminating the uncertainty of molecular dissociation by making the gauge sensitive to only one or two specific molecular species through simple mass spectrometer techniques.

The feasibility study of the use of these methods at high altitudes is currently under way and involves a study of (a) the theoretical limitation (b) inherent sources and estimates of errors (c) engineering difficulties (d) space and weight requirements (e) estimated cost per flight. An analysis of these studies will determine which method has the better chance of success, but at present it appears that both should be tried. Perhaps both may be flown simultaneously in each rocket vehicle.

(2) Design and construction of preliminary models of equipment for one or both methods

This step of the task involves the design and construction of the equipment which is expected to be flown in the initial series of rocket

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flights. This step may include wind tunnel tests or rocket flight tests of specific portions of the total instrumentation for the method, as well as the final packaging of at least two sets of the equipment for the rocket flights of each of the two methods.

(3) Initial rocket flights of the equipment for one or both methods

This step includes the field operation involved in preparing the equipment for actual rocket flight together with the necessary operation of the rocket flights for each method. The preparation for two flights is insurance against rocket or other failure during the first flight.

(4) Evaluation of flight performance and necessary redesign of equipment

This step involves the detailed study of the telemeter record of the flight to determine the performance of the various parts of the measuring equipment, as well as the transcription of recorded data to usable form for computation of the required atmospheric parameters. Deficiencies in the performance of the equipment detected by the record are then to be removed by suitable redesign. Because of the urgency of the program, major portions of the equipment should already have been constructed at this point for the series of data-gathering flights and it will be necessary to take the chance of having to modify some of the components at this stage of the task.

(5) Major series of data gathering rocket flights

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This step of the task involves the flying of three to ten sets of instrumentation for density and or pressure measurements in special 300 mile altitude rockets presently being designed for AFCRC or in non-orbiting ARS Weapons System test vehicles or both. Contact will be made with the ARS Weapon System office to obtain space in these test vehicles. If the first three flights indicate sufficient self-consistency the balance of the data gathering flights can be cancelled.

The special 300 mile altitude rocket is a multi-stage system made up of existing rocket components, i.e., Cajun rockets and Nike boosters. An engineering study presently contracted for will result in engineering drawings for the necessary fins and coupling devices and nose cone necessary to combine the propulsion system into an atmospheric data gathering rocket system capable of carrying 40 lbs. of instrumentation to 200 - 300 miles. Upon completion of this engineering study, engineering drawings will be available from which the necessary parts and propulsion units may be built and purchased at an estimated cost of $20,000 per rocket system.

(6) Analysis of data and preparation of revised atmospheric model

This step of the task involves the reading of telemeter records, the computation of the values of the atmospheric parameters, and

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the compilation of these data into consistent atmospheric models. This step is not necessarily limited to follow step (5) chronologically, but will follow each rocket flight from which usable data results.

(7) Repackaging of equipment for test satellite vehicles

This step involves the electrical mechanical redesign of the equipment used in the rocket firings of step (5) or planned in steps (1) and (2) to make that equipment suitable for gathering desired atmospheric data from ARS test vehicle.

(8) Installation and flight of density and pressure measuring equipment in satellite vehicle

This phase involves the field operation of a program for measuring atmospheric density and pressure at orbital altitudes of satellite test vehicles, and would be followed by a reapplication of step (6).

4. (a) T-39794 - Thermal Radiation Program for ARS

(b) This task will be accomplished through a combination of "in-house" and contractual effort. Present contractor is the University of Colorado under Contract AF 19(604)-1899. Additional contracts are contemplated.

(c) The objective of this task is to measure the intensity of irradiant heat sources above the atmosphere.

The radiation environment is one of the external conditions which may grievously affect the period during which information can be obtained from an oribiting satellite.

To be operational, the design of the satellite must be engineered so as to maintain within pre-determined limits the temperatures of vital communication components, such as electronic units, batteries, etc. If and when nuclear sources are used for power, then the excess energy must be radiated away from an external heat exchanger; its design requires a knowledge of the radiation exchange environment.

The temperature of a satellite in orbit at given times and places can be calculated. Required for these calculations are a knowledgeof the interstellar heat sink into which it is radiating energy -- thus cooling it -- and a knowledge of the intensities of the thermal fluxes which tend to warm it. Estimates of the equilibrium temperature of the satellite can be verified only by measurements within the orbiting satellite. Under the worst condition the

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temperature within the communication equipment may cause it to fail before any information is received. A slightly more favorable but undesirable condition would be a premature failure of communcation, (Thus, should the absorptivity--equal to emissivity--of the skin of the satellite change while in orbit, the equilibrium temperature of the satellite might differ drastically from that calculated on the basis of design specifications.)

The objective of this task is, then, the development and testing of devices adequate for the measurement of the three irradiant sources--direct solar energy, solar energy reflected jointly from earth and atmosphere (I.E., albedo) and earth emissivity (in the infrared)--and the flux from a satellite into interstellar space.

It is proposed that flux measuring devices should be installed on the earliest test vehicles so that flux measurements can be obtained so long as communication with the satellite is continued. Should communications then cease, and should the thermal, flux measurements seriously disagree with the values in the design calculations, at least one source of possible trouble should be identified.

During the development and testing of the devices for measuring the three sorts of radiation, balloon and rockets equipped with these devices will be flown. As scientific by-products of the testing program, some confirmation of current estimates of the intensities of the three sources will be obtained. Our present information on the radiation environment is next summarized.

Reliability of Present Estimates of the Solar Constant and the Albedo and Infrared Emission of Earth Plus Atmosphere

a) The solar constant is believed to lie between 1.946 and 2.05 gram calories centimeter $^{-2}$ minute $^{-1}$, a deviation of 3% from the mean of 2.0 gm cal cn^{-2} min^{-1}(1,396 watts meter $^{-2}$).

b) For this discussion, the term albedo applies to the solar radiation reflected directly from the earth's surface and scattered and reflected from the atmosphere with its content of clouds. From point to point in the orbit of a satellite with orbital distances as now stated the albedo will be highly variable. Deviations may be expected of at least plus or minus 20 - 30 per cent from the mean value of the albedo which may be taken as lying between 36-56 per cent (I.E. approximately 36-56 per cent of the solar constant is diffusely reflected or scattered back from the earth).

c) The infrared emission of the earth may be estimated by theory. Current estimates for the various zones of latitude obtained by deduction may well be in error by 20 to 50 per cent; on the average energy to about 32 per cent of the solar constant is diffusely emitted as infrared radiation from the unit consisting of earth and atmosphere.

[redacted] [redacted]

(d) Approach

I. Introduction

The following subtasks are foreseen:

(1) The design, development, testing and calibration of devices for the measurement of radiation of the following kinds.

(a) Total radiation from 0.27 to 2.7 microns (By "total" is a single detector which integrates the energy in the specific spectral region non-selectively -- i.e., recording to heating value, not by number of photons.)

(b) Total radiation from 4 to 20 microns.

(2) The design, development, testing and calibration of temperature sensors.

(3) Considered, but at present neither planned, funded nor contracted, would be the study of the temperature of a model of the satellite in a simulated radiation environment in a test chamber in the laboratory, or balloon-borne to an altitude where the air pressure approximates ten millibars (about 100,000 feet).

(4) A subtask within scope of this task, but deserving separate discussion will result in new techniques, design experience, and data important to ARS as vehicles for reconnaissance. This subtask is amplified specifically in Section II, Activities in "(4) Activities -Infrared Background Studies".

II. Activities

(1) Activities - General

The statement of the task may be amplified by noting that the satellite in its orbit will be warmed by energy from sun and from earth and cooled by radiating energy outward. Its native temperature will vary between upper and lower limits determined by intrinsic qualities (skin absorptivity and emissivity for various parts of the spectrum from ultraviolet through far ultraviolet and the heat capacity), and the trajectory (portion of period of orbit when irradiated by sun plus earth, or in the eclipse shadow of earth when irradiated by earth emission only; and the distances from earth at apogee and perigee, and whether these occur in sunlight or in shadow.

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[redacted]

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[redacted] [redacted]

Further, it is probably that various other sources of heat may be added as the development of the satellite proceeds from the preliminary phases of design, construction, and test to the more sophisticated, complex designs. For example, possibly a fission reactor may serve as source of power for attitude control and for electronic equipment. The introduction of such a heat source will complicate the engineering considerations because the efficiency of the removal of the excess heat will depend on the thermal environment of the heat exchangers.

(2) Activities --- Model Study

A possible activity which, as noted above, has not passed beyond the discussion stage, is that of the M$_o$del Study for obtaining approximate values of the equilibrium temperatures under working conditions a simulated satellite might be studied. By appropriate choice of the model, which would incorporate such devices as quartz windows inserted into the sphere, probably supplemented by isolated heat - detecting receivers, it is probably that significant information could be obtained. Such a model could be tested in a "Stratospheric Chamber" equipped with appropriate radiant heat sources. Or, the model satellite could be carried by balloon to high altitudes ---about 100,000 feet where pressures approximating 8 mm Hg. would minimize convective cooling.

In such studies numerous experimental details would have to be carefully watched. For the receivers consideration would have to be given to the absorption of radiation by the receiving surfaces ("blackness" to different spectral regions to the "color temperature" of the radiant flux), also to the conditions for the conductive removal of heat, and to the necessary precautions against convective cooling, since in the satellite at orbital altittudes there would be no convective cooling.

Departures from anticipated temperature by the satellite in its early history would be reason to look for unique influence -- heating by collision with meteoric matter, shortwave radiation with more than the expected intensity of gamma radiation.

Such a model might lend itself to experimental work in the design of a satellite to be powered by a fission device.

(3) Activities -- Design and development of the temperature and radiation sensing equipment

It is recognized that measuring the temperature of the skin and of the important points within the satellite in order to confirm the adequacy of the design is primarily the concern of the contractors. However, the themal flux sensors and the temperature sensors both will most likely be built around thermistors, hence, for reasons of design efficiency they would be parts of a common system. All thermal flux devices have high temperature coefficients, and the design will require a reference standard for absolute temperature determination.

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It has been noted the type of thermal flux detector used should be "total" and "non-selective." As distinguished from photo-conductive detectors, the preferred type would be the "temperature" detector, i.e., the absorbed energy is measured by temperature change using a thermocouple or a thermister or equivalent.

Hence, the development and testing (including calibration) of the radiation sensors involves the use of the same accessory electronic equipment for imparting information to the telemetering system as would be used when thermistors are employed for obtaining temperature data within the satellite. A minor activity from the viewpoint of both man-hours and dollar costs, is therefore involved adding the responsibility for development, testing and calibration of the temperature sensing devices to the identical responsibilities for the devices for measuring thermal flux.

Timely and detailed reports of progress on this task will be provided so that designs of the temperature sensors and accessory electronic equipment will be available to the prime contractor for his use in instrumenting early test vehicles.

Approximately six months have passed since Contract AF 19(604)-1899 for $40,000 was awarded to the University of Colorado for work on this task. Relatively good progress has been made in the design of compact lightweight transistorized thermal flux detectors available soon for testing in high altitude balloon flights. However, for quantitative thermal flux measurements one accepted technique is alternately to expose the radiation sensor to the thermal flux to be measured and then to view a reference standard or flux (a black-body) determined by its absolute temperature. It is the development and testing of these assemblies of components which will demand the major effort.

(4) Activities -- Infrared Background Studies

In reconnaissance "vision" is involved. With the eye as the detector, the significant bandwidths used in vision are 0.4 to 0.7 microns. "Vision" in the ultraviolet involves a detector in the range 0.2 - 0.4 microns. In the infrared, "vision" comprises wavelengths from 0.7 to 25 microns. It is obvious that "vision" is the discrimination of an object viewed with a given bandwidth against a "background" also "seen" by the detector. Further, radiation scattered toward the detector by material between the object and the detector obscures vision (cf. visibility through fog).

Reconnaissance by use of far infrared introduces another factor not unlike the scattering effect in visibility through fog. That is, the radiation from the object and its background will be veiled by the energy emitte by the strata of atmosphere between object and detector. In the region from

[redacted]

4 to 24 microns knowledge of temperatures, spectral emissivities (equal absorptions) of the specific gases of the atmosphere are required. Much is known about the pressure dependence of the absorption but easy calculation is not yet possible.

Both experimental and theoretical phases under this infrared background study are planned:

Experimental:

(1) The design and construction of a far-infrared spectrometer to be borne aloft by balloon capable of measuring the terrestrial thermal flux, spectrally resolved from 4 to 24 microns, etc. The work to be contracted.

(2) Design and construction of balloon borne equipment to measure attenuation of the infrared solar flux in the region of 0.8 to 9 microns at various altitudes from 5,000 to 100,000 feet, with sun at low altitudes to increase the path length through the atmosphere. The work to be contracted.

Theoretical:

(3) The thermal emission from model atmosphere corresponding as closely as possible to the terrestrial atmosphere will be calculated using the latest available and suitable modified laboratory transmission functions. The emission will be computed for various heights to be later specified in the atmosphere. The work to be contracted.

#154

Possible contractors, and the possible Principal Investigators are:

Johns Hopkins University, Prof. John F. Strong
University of Utah, Prof. J. V. Hales (with Prof.
    W. Elsasser, Consultant, Scripps Institute of
    Oceanography)
Aerotronics, Glendale, Calif., Dr. Gilbert N. Plass
University of Colorado, Prof. W. S. Rense
University of Denver, Mr. David Murcray
Ball Bros. Research Institute, Dr. David Stacey

(5) Activities - By-Products Directly Applicable to ARS

The main groups of by-products of the program of work on the Thermal Radiation program may be anticipated for ARS. One group is the reduction in the uncertainty in the three sorts of radiation intensities

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noted as important -- the solar constant, the albedo associated with various physiographic features of the earth (both the earth surfaces itself and cloud cover meteorologically and physiographically determined), and the infrared emission. During the testing of the thermal radiation sensors during ballon and rocket flights data will necessarily accumulate which may reduce the error in present estimates of the intensity of these radiations.

The studies undertaken during the assessment of the radiation environment of the satellite will produce new knowledge about the energetics of the planet earth and its atmosphere. The new knowledge, as well as the sensors and accessory equipment from the task on thermal environment, will be of advantage to the contemplated Weather Reconnaissance Project in the event that is undertaken. Hard and fast lines cannot be drawn separating the work on thermal flux sensors from the work on the sensors which could be used on the Weather Reconnaissance Project. To the extent that work on this task (T-39794) advances the work on the Weather Reconnaissance Project, this later progress may be considered a by-product. However, under the Weather Reconnaissance Project would be required the production of sensors specifically adapted for installation in aircraft, and following the flights, reduction and study of the data. Such work is not contemplated in the budget proposed for this task.

5. (a) Task 39795 - Rocket and Instrumentation Support

(b) This task will be accomplished through a combination of "in-house and contractual effort. The type of effort required by this task is being carried on by AFCRC under GRD P-7659. In P-7659 several contractors have been used and have attained a competence in their respective areas (See Approach) In view of this competence, many of the same contractors will be used to accomplish the objectives of this task. Contemplated contractors include:

1.) Aerojet - General Corporation
2.) Wentworth Institute
3.) Oklahoma A and M
4.) New Mexico A and M

(c) The task objective is to instrument and launch research rockets in support of the objectives of the other tasks in this project.

Requirement and/or Justification

The requirement for this task is delineated in the approach of each of the other tasks of the project.

(d) Approach

[redacted]

Tr. 57-11140

The instrumentation and launching of research rockets require

(1) The provision of vehicles and launch facilities suitable to each experiment.

(2) The instrumentation of the nose cone. This effort may vary from simple attachment to the rocket to adaption of the experimental equipment to the vehicle and its support instrumentation.

(3) Collateral instrumentation for tracking, telemetering, range safety, data recording, parachute recovery, special sequencing and command of experiments, orientation of sensing devices (biaxial pointing control) and others.

(4) The provision of suitable ground data recording equipment.

Techniques and procedures have been established under GRD P-7659 to accomplish the desired results in the above areas of effort. In order to meet the requirements of the other tasks of this project, the same techniques and procedures will be followed under this task. In particular, the same contractors and facilities will be used, where applicable, and coordination with necessary test facilities will be carried out in the same manner as under P-7659.

In order to efficiently and effectively make use of system test vehicles close coordination will be established with the prime contractor. Such liaison is necessary to adapt the experiment to system test vehicles from the standpoint of size, weight, available telemeter, power, etc.

d. Other Information

Not applicable

e. Background History

System Requirement No. 5 dated 17 October 1955 subsequent letter directive from WDD placed on AFCRC the responsibility of providing environmental data effecting the design and test of ARS vehicles. Studies by the Geophysics Research Directorate, AFCRC, the design study contractors and the ARS Weapons System office determined that in certain areas the state of the art was such that additional data would be required to satisfy the design requirements of ARS. In December 1955 and January 1956 Tasks 76971, 76972, 76973 and 76974 under Project 1115 were prepared by Geophysics Research Directorate, Air Force Cambridge Research Center. These tasks were, with certain exception approved by WDD 3 July 1956. This project constitutes a rewrite of these tasks under Project 1764 in support of WS 117-L.

[redacted] [redacted]
[redacted]

f. Future Plans

This project is for the specific purpose of providing environmental design data for the Advanced Reconnaissance System, therefore, the various task and subtasks will be terminated, with concurrence from the WS 117L WSPO, when it is apparent that sufficient data has been obtained in a particular field to satisfy design requirements or to determine a no hazard condition to the ARS vehicle and operational subsystems.

Conversely close coordination will be maintained with the WSPO and prime contractor so that new tasks can be timely instituted to meet requirements generated by the introduction of new design conception.

g. References

ARDC System Requirement No. 5 dated 17 October 1955

Secret Letter WDD to AFCRC sub: Support of Advanced Reconnaissance System (U) dated 23 December 1955.

WS 117L Advanced Reconnaissance System Development Plan dated 2 April 1956.

ARDC System Development Directive Advanced Reconnaissance System dated 17 August 1956.

SIGNED

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Project Scientist
Photochemistry Laboratory

SIGNED

MILTON GREENBERG
Director
Geophysics Research Directorate

SIGNED

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Frederic C E Oder

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FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS117L

[redacted]

1. Special Annex for Mission Support Funds	2. Reports Control Symbol
	Page of page
	3. DATE: 2 April 1957

4. TITLE 5. Initial 6. NUMBER - 1764

(UNCLASSIFIED TITLE) Geophysical Environment for ARS, WS 117L

SHORT TITLE: ARS Environment

1a. $4255. of P-690-02 funds will be required in the performance of task 39721 in FY 57.

(1)	6 trips to Los Angeles and Palo Alto, Calif. at $400.	$2400.
(2)	3 trips to Chicago, Ill. at $125.	375.
(3)	12 trips to New York, N.Y. at $40.	480.
(4)	Miscellaneous travel	1000.
		$4255.

b. This travel will be essentially to monitor contracts and coordinate with other Centers. The requirements for FY 57 will continue through FY 58 and FY 59.

c. In FY 58 six (6) additional trips to HADC at $400. each will be required to arrange rocket tests.

d. In FY 59 twelve (12) additional trips to HADC or Patrick AFB at $400. each will be required for rocket tests on apparatus.

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e. Therefore, for FY 58 P-690-02
$6655.

FY 59 $9055.

2a. $8000. of P-690-02 funds will be required in the performance of T-39792 during FY 57. Specifically it is contemplated.

(1)	12 trips to Holloman Air Development Center, N.M. at $450. each	$5400.
(2)	4 trips to San Francisco, Los Angeles area, Calif. at $400. each	1600.
(3)	3 trips to Philadelphia, Pa. at $50. each	150.
(4)	Miscellaneous travel; $850	850.
	TOTAL	$8000.

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b. Travel to Holloman Air Development Center will be performed in carrying out high altitude rocket experiments. Each rocket experiments. Each rocket firing requires at least two (2) personnel for a period of a week to ten (10) days.

c. It is contemplated that some of the shaped-charge experiments may be performed by the Poulter Laboratories in the San Francisco area. Research on High Speed Impact Phenomena will be coordinated with Rand Corporation in Santa Monica. Temple University in Philadelphia has developed acoustical apparatus for the detection of meteoric impacts.

d. The travel requirements for this task thru FY 59 will probably remain at about $8000. per year.

3a. $5970. of P-690-02 funds will be required in the performance of Task T-39793 in FY 57.

(1)	2 trips to Los Angeles, Calif. at $400. each	$800.
(2)	4 trips to Ann Arbor, Mich. at $125. each	500.
(3)	8 trips to HADC, N.M. at $400. each	3200.
(4)	2 trips to Chicago, Ill. at $125. each	250.
(5)	8 trips to New York area at $40. each	320.
(6)	Miscellaneous travel	1000.
	Total	$6000 00

b. This travel will be essentially to monitor contracts and coordinate with other Centers. The requirement for FY 57 will continue through FY 58 and FY 59.

c. In FY 58, 7 additional trips to HADC at $400. and 2 additional trips to Los Angeles at $400. will be required to participate in rocket data gathering flights and monitoring contracts.

d. In FY 59, 4 additional trips to HADC at $400. will be required to participate in rocket data gathering launchings.

3. In FY 60 travel will be required as follows:

(1)	2 trips to Los Angeles at $400. each	$800.
(2)	2 trips to Chicago at $125. each	250.
(3)	3 trips to New York at $40. each	120.
(4)	Miscellaneous travel	300.
	Total	$1470.

Therefore,	P690-02
FY 58	9570
FY 59	7570
FY 60	1470

[redacted]

4. $3,225.00 of P-690-02 funds will be required in the performance of task T-39794 during FY 57. Specifically we contemplate:

(1)	3 trips to Los Angeles, California at $400. each	$1200.
(2)	4 trips to Baltimore, Maryland at $60. each	240.
(3)	3 trips to Chicago, Illinois at $125. each	375.
(4)	2 trips to Holloman ADC, N.M. at $400. each	800.
(5)	2 trips to WADC, Dayton, Ohio at $100. each	200.
(6)	2 trips to RADC, Rome, N.Y. at $55. each	110.
(7)	Miscellaneous travel: $300.	300.
		$3225.

a and b Travel to the Los Angeles area and to the Baltimore area is predicted on the assumption that the contractors, at least for the vehicles for scientific measurements, will be in either or both areas. Also, at least one visit to WDD is contemplated.

c. Travel to the Chicago area is included on the assumption that contractor for the temperature and radiative transfer sensors might quite probably be in Chicago or equally distant from Boston, Mass.

d. Travel to Holloman ADC looks forward to preliminary testing of instrumentation in the upper atmosphere by balloons or rockets, or both.

e. Travel to WADC and to RADC will be required to coordinate the various Center efforts. It is possible that the number listed is a minimum and that more will be required.

f. Miscellaneous travel to discuss specific problems with experts at various Universities will be required.

g. After FY 57 we anticipate that because of the increased activity the travel requirement will be increased to an average $4,500. per year.

h. An annual average of $1000. of P-690-03 funds will be required to transportation of instrumentation units during FY 58 and FY 59.

5a. $14,000 of P690-02 funds will be required in the performance of task T-39795 during FY 58.

(1)	12 trips to HADC at $500. each	$6000.
(2)	4 trips to Los Angeles, Calif. at $400.	1600.
(3)	8 trips to Palo Alto, Calif. at $450. each	3600.
(4)	4 trips to Patrick AFB, Fla. at $200. each	800.
(5)	Miscellaneous	2000.
	Total	$14,000.

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2KB-57-01140

b. Travel to HADC will be performed to participate in launching of high altitude rockets.

c. Travel to Los Angeles will be performed for coordination of program with WSPO.

d. Travel to Palo Alto will be performed for liaison in obtaining technical information on use of system test vehicles.

e. Travel to Patrick AFB will be performed for coordination and participation in launching of system test vehicles.

f. The travel requirements in this task are expected to remain essentially the same for FY 59 and FY 60.

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5-2

[redacted]

1. R & D SCHEDULE

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

3. DATE 2 April 1957

4. TITLE
(UNCLASSIFIED TITLE) Geophysical Environment Data for ARS, WS 117L
Short Title: ARS Environment

5. INITIAL ☒
CHANGE

6. NUMBER 1764

SCHEDULE		CALENDAR YEARS																																							
TITLE	PROJECT OR TASK NR	1955						1956												1957								1958				1959				1960				TO COMPL			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ARS Environment	1764													1							3			4				6			7			9	5				11				
																												8							10								
Solar U.V. and X-Ray	39791																																										
Intensity Measurement								3			4												6				7	7	7	7					11								
Sputtering																					3		4					6							11								
Interplanatary Matter & Met.	39792																																										
Rocket-Meteor Impact Studies														4					5	7		7	7			7	5	7	7	7	5				5								
ARS Meteor Detecting Studies																		4								7	5	8			5				5				11				
High Speed Impact Phenomena														3					5								5				5				5								
Theoretical Studies														3					5								5				5				5								
Satellite Altitude Density	39793																																										
In-House Studies														3	10											10		10		10				10	10								
Evaluation of Two Methods														1			2																										
Instrumentation & Rocket Test																						4						7	7	7	7												
ARS Test Vehicle Program																								4					7	7													
Therm RAD for ARS	39794																																										
Temperature Sensors											4			5			5					6	7								7	9	9	9	11								
Radiation Sensors											4			5			5	6		7				7							7	9	9	9	11								
Background Studies																																											
Theoretical																								4		5	5	5	5		5			11									
Experimental																								4		5	6	7	7		7	9	9	10	11								
Rocket Support	39795																			7		7	7			7	7	7	7	7	7												

Schedule Key:

1 - Let Study Contract
2 - Termination and Tech Rept (Study Contract)
3 - Begin In-house Studies
4 - Development Contract Awarded
5 - Technical Report
6 - Apparatus Tested in Lab
7 - Test & Data Gathering Flights
8 - Satellite Instrumentation Complete
9 - Measurement on ARS Flight
10 - Analysis of Data
11 - Final Report

ARDC FORM 103 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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R & D MANPOWER ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE 26 OF PAGES

3. DATE
2 April 1957

4. UNCLASSIFIED TITLE
Geophysical Environment Data for ARS, WS 117L
Short Title: ARS Environment

5. INITIAL ☒
CHANGE

6. NUMBER
1764

7. ORG COMP CODE	8. ORGANIZATION TITLE	9. TYPE ORG	10. ACTUAL MAN-QTRS LAST QTR	11. PROJECTED DIRECT MAN-YEARS FY 1957		FY 1958		FY 1959	FY 1960	TO COMPL
				AVAL	RQRD	AVAL	RQRD	RQRD	RQRD	RQRD
GRD	Geophysics Research Directorate AFCRC	R	4.5	5.0	24.5	5.0	29.0	32.0	26.0	
	TOTAL		4.5	5.0	24.5	5.0	29.0	32.0	26.0	
	Total Manpower Dollars		7,938	36,400	178,360	36,400	211,120	232,960	189,280	

Manpower Justification Attached:

[redacted]

#5-4 [redacted]

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R & D MANPOWER ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. *REPORTS CONTROL SYMBOL*

PAGE OF PAGES

3. DATE 2 April 1957

4. UNCLASSIFIED TITLE
Geophysical Environment Data for ARS, WS 117L
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5. INITIAL ☒
CHANGE ☐

6. NUMBER 1764

7. ORG COMP CODE	8. ORGANIZATION TITLE	9. TYPE ORG	10. ACTUAL MAN-QTRS LAST QTR	11. PROJECTED DIRECT MAN-YEARS						
				FY 19 57		FY 1958		FY 1959	FY 1960	TO COMPL
				AVAL	RQRD	AVAL	RQRD	RQRD	RQRD	RQRD

1. Task 39791 will require the services of a total of eight physicists (civilian or military) of qualifications equaling those of GS-12 or higher. Two of these are now available, both GS-13, and therefore six additional physicistswill be required, beginning immediately and extending through the duration of the project.

2. The manpower requirements on Task 39792 for measuring the influx of interplanetary matter is estimated on the basis that three physicists and one electronic engineer (GS-11 to GS-13) will be required during the initial phase of the program during the remainder of FY 57. As test firing increases in FY 58 and FY 59 an additional mathematician (GS-11) will be required in the analysis of this data. This research team will be reduced to three (3) through the completion of the task.
This group will be responsible for the overall planning of the program and the experimental rocket and satellite program. The application of significant experimental laboratory data, and the establishment of significant experimental laboratory data, and the establishment of theoretical design criteria will be made up by this group also. The preparation and prosecution of general scientific plans, coordination, monitoring of contractual research and development, the preparation of summary and technical reports will be handled by this team. It is believed that the scope of the problem involving acoustics, electronics collision theory, meteor physics and other basic studies should be handled by a team, with a minimum size of at least five (5) people. At this time, the magnitude of this program may not be determined until the first phase of the research has been completed.

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3. Manpower to perform research on Task 39793 will be divided into the following listed three (3) experimental teams:

a. Falling-Sphere Density Experiment Team

This team will consist of one task scientist (GS-12), one physicist (GS-11), and one engineer (GS-9)

b. Pressure Gauge Density Experiment Team

This team will consist of one deputy task scientist (GS-12), one physicist (GS-11), and one engineer (GS-9).

c. Data Reduction Team

This team will consist of one secretary (GS-3), and one computer (GS-9).

4. Responsibility of the 3 experimental teams will be as follows:

a. Falling-Sphere Density Team

(1) The responsibility of the Falling-Sphere Density Team will be to modify the existing Falling-Sphere Density Measuring Technique and scientifically develop, test and launch a modified instrumentation for density measurement at altitudes up to 500 Km.

(2) The responsibility of the task scientist is to plan and direct the over-all task program. In addition, he will directly administer the program of the Falling-Sphere team. He will consult with and advise the physicist and engineer in the theoretical study, design, development, laboratory testing, and contractual procurement of the flight model instrumentation; and will serve as Field Director at experimental test grounds.

(3) The physicist will be responsible for carrying out the team program of theoretical work on the applied and background research pertaining to the Falling-Sphere Density Experiment. He will be concerned with the evaluation of the theoretical aspects of the experiment, and all experimental progress in related fields of research. He will consult with, advise and assist the engineer in the laboratory experimental phases of the team program, and the electronic and mechanical design of instrumentation. He will be responsible for the preparation of scientific reports and papers as required in the experimental program.

(4) The engineer will be responsible for the team laboratory experimental program, the electronic and mechanical design and construction of instrumentation. He will initiate procurement of instrumentation. He will

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initiate procurement of and will monitor a contractor construction contract to build the final instrumentation for rocket installation. He will serve as field engineer during proving ground experimental tests.

5. Pressure Gauge Density Experiment Team

a. The responsibility of the Pressure Gauge Density Team will, in consideration of present methods limited to altitudes of about 130 km, scientifically plan, develop, test, and launch a rocket borne pressure gauge instrumentation for density measurement at altitudes up to 500 km.

b. The responsibility of the deputy task scientist will be to plan, direct and administer the program of the team. He will consult with and advise the physicist and engineer in theoretical study, design, development, laboratory testing, contractual procurement of the flight model instrumentation and will serve as Field Director at experimental test grounds.

c. The Physicist will be responsible for carrying out the team program of theoretical work on applied and background research pertaining to the Pressure Gauge Density Experiment. He will be concerned with the evaluation of the theoretical aspects of the experiment, and all experimental progress in related fields of research. He will consult with advise and assist the engineer in the laboratory experimental phases of the team program and in the electronic and mechanical design of the instrumentation. He will be responsible for the preparation of scientific reports and papers, as required in the experimental program.

d. The Engineer will be responsible for the ream laboratory experimental program, the electronic and mechanical design and construction of instrumentation. He will initiate procurement of, and will monitor a contractor construction contract to build the final instrumentation for rocket installation. He will serve as field engineer during proving ground experimental tests.

6. Data Reduction Team - The responsibility of the Data Reduction Team will be to reduce telemetered, photographic, and other transmitted data that may be supplied from airborne density instrumentation; and to present this data in useful form for geophysical interpretation.

7. The Task 39794 Planning and Supervision will be under the direction of a Task Scientist. Throughout the period of the task, he will be responsible for the preparation and prosecution of the general scientific plans and for the coordination of work of the contributing agencies of the entire program. He will be responsible for all the phases of the program, including selection of contractor, approval of proposals, supervision of both contractual

[redacted]

and in-house efforts contributing to design, fabrication, test, calibration and data reduction and interpretation -- in short, the integration of the results of the contract program and the in-house programs. The Task Scientist is currently available.

8. a. The manpower requirements for T-39795 for Rocket and Instrumentation Support are estimated on the basis that four Research Engineers, (GS-11 to GS-13) will be required during FY 57 to accomplish instrumentation for the required program. During FY 58 an additional two Research Engineers will be required to absorb the load of frequent field trips to rocket launch sites and to maintain the heavy schedule of rocket preparation and firings. In FY 59 two additional Research Engineers will be required to conduct liaison on instrumentation of orbiting and non-orbiting test vehicles.

b. This group will be responsible for the instrumentation of all rocket experiments in the program for coordination with launch sites, for collection and recording of data from rocket flighs and for liaison and planning with prime contractor in use of system test vehicles.

5 F ~~27~~ [redacted]

1\.

R & D CONTRACT FUNDS ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE 31 OF 32 PAGES

3. DATE 2 April 1957

4. TITLE
(UNCLASSIFIED TITLE) Geophysical Environment Data for ARS, WS 117L
(Short Title) ARS Environment

5. INITIAL ☒
CHANGE

6. NUMBER 1764

7. ITEM	8. PROJ OR TASK NR	9. END ITEM CAT	10. CONTRACT NUMBER	11. BPSN	12. PREV YRS		13. FY 57		14. FY 58		15. FY 59		16. FY 60		17. TO COMPL	
					600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER
ARS Environment	1764	R&E	Various	2-117	160M		422M		1000M		1410M		425M			
P-100 Funds:						6M				950M		470M				
P-200 Funds:												50M				
Sub-Totals:																
			P-600		160M		422M		1000M		1410M		425M			
			P-100			6M				950M		470M				
			P-200									50M				
TOTAL					160M	6M	422M	0M	1000M	950M	1410M	520M	425M			

ARDC FORM 110 PREVIOUS EDITIONS OF THIS FORM ARE OBS [redacted]

248-57-01140

G 59 [redacted]

R & D COST ESTIMATE RECAPITULATION

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE 32 OF 32 PAGES

3. DATE 2 April 1957

4. UNCLASSIFIED TITLE Geophysical Environment Data for ARS, WS 117L
Short Title: ARS Environment

5. INITIAL ☒ CHANGE

6. NUMBER 1764

ITEM		A. PREVIOUS YEARS		B. FISCAL YEAR 57		C. FISCAL YEAR 58		D. FISCAL YEAR 59		E. TO COMPLETE	
		600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER
7. CONTRACT	A. TOTAL	160M	6M	422M		1000M	950M	1410M	520M	425M	0
	B. AVAILABLE	160M	6M	422M							
	C. NEW REQ					1000M	950M	1410M	520M	425M	0
8. MATERIEL	A. TOTAL										
	B. AVAILABLE										
	C. NEW REQ										
9. FACILITIES											
10. MANPOWER		7.9M		36.4M		178.4M		36.4M		422.2M	
11. TRAINING		N/A									
12. TEST ITEMS		N/A									
13. TEST SUPPORT AIRCRAFT		N/A									
14. SUBTOTAL		160M	6M	422M		1000M	950M	1410M	520M	425M	0
15. TOTAL		173.9M		458.4M		2128.4M		1966.4M		847.2M	

ARDC FORM 116 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE. 32 [redacted] ND-57-01140

[redacted]

R&D PROJECT CARD

Rewritten Project

REPORT CONTROL SYMBOL DD-R&D/A/119

5

1. PROJECT TITLE (UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

2. SECURITY OF PROJECT SECRET

3. PROJECT NO. 8728

4. INDEX NUMBER 2-117

5. REPORT DATE 2 April 1957

6. BASIC FIELD OR SUBJECT Strategic Air Warfare System (117L)

7. SUB FIELD OR SUBJECT SUB GROUP Personnel Utilization, 65

7A. TECH. OBJ.

8. COGNIZANT AGENCY Air Research and Development Command Western Dev.Div.

9. DIRECTING AGENCY AFPTRC

10. REQUESTING AGENCY Hq USAF

12. CONTRACTOR AND/OR LABORATORY
Lockheed Aircraft Corp
Office for QPRI
Maintenance Laboratory
Operator Laboratory
Personnel Laboratory

CONTRACT/W. O. NO. AF04(647)-97

11. PARTICIPATION AND/OR COORDINATION

AMC (I)	ACIC-I
APGS (I)	USN/CND-I
ATC (I)	USA/C/S-I
SAC (I)	Other/AEC-P
ADC (I)	
CIA (I)	

13. RELATED PROJECTS WS-117L

14. DATE APPROVED

15. PRIORTY 1A

16. MAJOR CATEGORY A(Missiles)

INFORMATION COPY

17. EST. COMPLETION DATES

RES.	
DEV.	Dec 1960
TEST	
OP. EVAL.	

18. FY	FISCAL ESTIMATES
56	.2M
57	22.8M
58	156.0M
59	164.0M
60	124.0M
Total	467.0M

19. REPLACED PROJECT CARD AND PROJECT STATUS This rewritten report supersedes New Project Report on this project dated 28 February 1956

20. REQUIREMENT AND/OR JUSTIFICATION Requirement for this project was established by ARDC System Requirement No. 5, dated 17 October 1955, which directed this Center to support the preparation of a System Development Plan. Responsibility for technical support in the execution of the WS 117L Development Plan was assigned under the provisions of ARDC System Development Directive No. 117L, dated 17 August 1956. Specific approva for inclusion of project for development of Qualitative Personnel Requirements Information (QPRI) was contained in Amendment No. 2 to SDD No. 117L, dated 1 October 1956. ARDC Project Development Directive No. 8728, October 1956, directed implementation of this Center's plan for development of QPRI (Project Development Pl No. 8728, dated 28 February 1956) for WS 117L. Requirement for re-writing the original plan for development of QPRI for WS 117L was established as a result of two separate actions First: the Weapon System Project Office (WDD) directed eac Center concerned with the development of WS117L to rewrite project development plans to align objectives in consonance with the Statement of Work which was prepared recently for contractual negotiations, reference 21i(7). Second: the application of existing research techniques in the areas of job analysis and description, training programming, training equipment requirements and evaluation will provide valuable support to the development of the personnel sub-system of WS117L. This project is designed to yield optimum information needed by planning agencies concerned with the personnel and training aspects of weapon system 117L.

22. OASD (R&D)	SN.	CN.	C.	X.	I.	C.

DD FORM 1 APR 55 613
REPLACES DD FORM 613, 1 JAN 52, WHICH MAY BE USED.

UNCLASSIFIED

PAGE 1 OF 7

GPO

[redacted]

(UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

21a. Brief of Project and Objective:

The development of this project will utilize the technical and operational capabilities of the Air Force Personnel and Training Research Center in the production of systematic information relevant to the personnel and training requirements of the total weapon system 117L development plan.

21b. Approach:

This project will require both contract and inservice efforts to facilitate correlation between personnel subsystem development and equipment development. Initially, great reliance will be placed upon the prime contractor to develop and systematically integrate information derived from conceived equipment design. Information will be prepared by the contractor with consultative and technical monitoring effort on the part of the AFPTRC project officer. Contract work in support of task efforts and in-service efforts are indicated below.

21c. Tasks of the Project:

(1) Task 87151-IMPLICATIONS OF DESIGN.

(a) Contractor: Work under this task will be accomplished primarily by the prime contractor, with consultative and technical guidance furnished by Project Officer, this Headquarters.

(b) Objective: To provide the preliminary data needed to prepare an early report, or reports, which will forecast the general personnel subsystem requirements and the personnel and training problems that adoption of the system may generate.

(c) Approach: Since this weapon system does not readily lend itself to the concept of control by a major air command or primary interest by a single agency of the Air Force, consideration will be given to the thorough exploration of the personnel implications under various operating-controlling conditions. Basically, the report(s) will attempt to define problems which will be generated by both operational plans and equipment design In so doing, consideration will be given to the relationship of WS-117L to WS-107A-1 and possibly WS-107A-2 and the findings of previous research in support of these latter systems.

[redacted]

(UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

(2) Task 87300-QUALITATIVE PERSONNEL REQUIREMENTSJINFORMATION.

(a) Contractor: Data will be collected and assembled by the prime contractor for the production of reports which will be phased with equipment design and development.

(b) Objective: To provide manning document information, position descriptions, and personnel selection information regarding the total personnel subsystem of WS117L.

(c) Approach: Effort in this area will be directed toward the development of information which can be used to describe technical jobs associated with the operation and maintenance of the system. From these descriptions, forecasts of required skills and knowledges will be made. Early identification of skills and knowledges and subsequent classification, if possible, within the Air Force personnel system will permit forecast of training requirements. Information derived in the development of the foregoing area will be used for manning information when operational and maintenance concepts are stabilized

The QPRI report will comprise four sections: General Information, Manning Document Information, Training Equipment Requirements Information, and Information on Special Problem Areas. The format of the report will be patterned after AFPTRC QPRI reports which have been published for ballistic missile systems.

Section one, General Information, will describe the general purpose and function of the system, as well as stated or assumed concepts of operation and maintenance.

Section two, Manning Document Information, will: identify all equipment-associated operator and maintenance positions; indicate tasks performed within each job-position; indicate skill levels required for those positions requiring new personnel skills; and reference Air Force specialties which most nearly identify the job-positions.

Section three, Training Equipment Requirements Information, will identify in general terms the special training devices which will be needed to impart new skills required for the operation and maintenance of the weapon system. Further action in this area is defined in a subsequent task.

Section four, Special Problem Areas, will include an expansion of the problem areas (identified in the "Implications of Design" report) which can be isolated under a specific set of conditions. This portion of the report will identify personnel problems of an organizational and/or command nature.

(UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

(3) Task 87152-TRAINING PROGRAMS AND PROCEDURES.

(a) Contractor: None.

(b) Objective: To make recommendations for the training program and training procedures to be used to obtain skills required by operator and maintenance personnel of the system.

(c) Approach: Recommendations for specific training procedures will be made in consonance investigative findings from prior tasks. Emphasis will be given to those areas in which the training of skills may prove particularly significant and difficult.

(4) Task 87153-TRAINING EQUIPMENT CHARACTERISTICS.

(a) Contractor: Preparation of a report on the training characteristics of required trainers will be an in-service effort. Previous contractual efforts will be used, if applicable.

(b) Objective: To identify the special training devices required for the WS-117L training program and define the characteristics of the individual trainers.

(c) Approach: Consideration will be given to the adaptation and/or modification of research instruments into prototype training devices. Also, attention will be given to the possible use and/or adapting of special training devices, developed for the ballistic missile training program, which possess characteristics identified by this task effort, e.g., Radar Tracking and Guidance Computer Trainer.

[redacted]

(UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

(5) Task 87154-PROFICIENCY TEST DEVELOPMENT.

(a) Contractor: To be determined. Partial in-service effort by Personnel and Maintenance Laboratories monitored by this Headquarters.

(b) Objective: To provide valid tests of the job knowledge, skill, and achievement varity for measuring the progress and/or proficiency of operating and maintenance personnel.

(c) Approach: This activity will consist essentially of establishing, monitoring and evaluating the test materials to be produced on a contract basis.

(6) Task 87155-HANDBOOKS AND JOB AIDS

Further detail on this task will be provided as the system progresses.

(7) Task 87156-TRAINING EQUIPMENT TESTING

Further detail on this task will be provided on this task as system development progresses.

21d. Other Information.

(1) General. The information basic to the preparation of reports required by Task 87151 and Task 87300 efforts will be obtained through contractual effort. Publication of these reports on a contractual basis may be accomplished with this Headquarters acting in a consultative and monitoring capacity It is anticipated that contract funds in the amount indicated in ARDC Form 110 will be programmed through funding action to be taken by the Weapon System Project Office for WS 117L.

Tasks 87152, 87153, 87154, 87155, and 87156 have been included under the assumption that Tasks 87151 and 87300 will produce information which indicates further effort should be expended to meet an Air Force requirement for information in the areas covered by these tasks. However, further development effort will not be expended in those task areas in which the associated final activities are purchased by the Air Force as a contract-service, e g. Task for development of handbooks and job aids will not be undertaken if it is determined manning on a contractual basis is required or desired.

(2) Survey of Existing Standardize Equipment or Techniques.

None except as discussed in Task 87152 and Task 87153.

[redacted]

(3) Survey of Similar Equipment in Progress of R&D.

Survey will be made to determine possible adaptation of research instruments into special training devices. Similar exploration will be made in the area of trainers being developed for ballistic missile systems.

(4) Replacement Recommendations. None.

(5) Statement of Effects.

This project will yield information useful to the agencies responsible for programming the personnel and training programs required to properly man WS 117A.

21e. Background History and/or Progress.

Since the writing of the initial project card, several visitis have been made to WSPO to determine funding status and to obtain general information on status of system development. As previously mentioned, representatives from this Center participated in preparation of statement of work for contractual negotiations. WSPO clearance was obtained to make initial contacts at contractor facility to discuss development plan relevant to the personnel subsystem. System contractor personnel were familiarized with the QPRI program and the nature of tasks involved in the development plan for personnel and training problems. Visit to contractor revealed that competent staffing has been accomplished to perform the caliber of work desired. Arrangements have been made to furnish contractor with format guides for reports to be published under this development project.

21f. Future Plans. Tentative arrangements were discussed with prime contractor for publication of Task 87151 report during June 1957. Also discussed were plans for publication of initial QPRI report (Task 87300) during December 1957 or early January 1958.

The project officer will maintain close contact with WSPO to establish proper phase relationships of project effort with equipment development status which is, in turn, largely dictated by funding action.

21g. References.

(1) ARDC System Requirement No. 5, dated 17 October 1955.

(2) Project Development Plan No. 8728 (DD Form 613), 28 February 1956.

(3) WS 117L Development Plan (WDD), 2 April 1956.

(UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

(4) ARDC System Development Directive No. 117L, 17 August 1956.

(5) Amendment No. 2 to ARDC SDD No. 117L, 1 October 1956.

(6) Project Development Directive No. 8728, October 1956.

(7) Letter WDTR, Hq ARDC, 18 December 1956, subject, "Meeting of Technical Advisors to WS 117L".

21h. Coordination and Signature Block.

Responsible Center, AFPTRC.

Fred Roberts Lt Col
For STANLEY VALCIK
Major USAF
QPRI Project Officer

Thomas Wildes
THOMAS WILDES
Col USAF
DCS/Operations

Frederic E Oder
FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L
Technical Operations (WDD)

67

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R & D SCHEDULE

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

3. DATE 2 April 1957

4. TITLE (UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

5. INITIAL ☐ CHANGE #1

6. NUMBER 8728

SCHEDULE		CALENDAR YEARS																																									
TITLE	PROJECT OR TASK NR	19 57						19 58												19 59								19 60				19				19				TO COMPL			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
System 117L QPRI	8728																													2													
Implications of Design	87151				2																																						
QPRI	87300																									2																	
Training Programs & Proc	87152				1																								2														
Training Equipment Char	87153				1																								2														
Proficiency Test Devel	87154																			1									2														
Handbooks & Job Aids	87155							1																					2														
Training Equip Testing	87156															1													2														

1-Contract Awarded

2-Technical Documentary Report Received.

768

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R & D MANPOWER ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE 1 OF 1 PAGES

3. DATE 2 April 1957

4. UNCLASSIFIED TITLE a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

5. INITIAL ☐ CHANGE #2

6. NUMBER 8728

7. ORG COMP CODE	8. ORGANIZATION TITLE	9. TYPE ORG	10. ACTUAL MAN-QTRS LAST QTR	11. PROJECTED DIRECT MAN-YEARS						
				FY 19 57		FY 19 58		FY 19 59	FY 19	TO COMPL
				AVAL	RQRD	AVAL	RQRD	RQRD	RQRD	RQRD
PTQ	Office for QPRI	R	.3	.9	2.2	.2	.4	3.5		
PTF	Operator Laboratory	R	#	.2	.3	.2	.4	1.6		
PTR	Maintenance Laboratory	R	#	1.5	1.5	3.8	3.8	4.8		
PTS	Office for Social Science Programs	R	#				.5			
	Total Manpower		.3	2.6	4.0	4.2	5.1	9.9		
	Total Estimated Manpwr Dollars		1M	21M	34M	36M	43M	84M		

69

UNCLASSIFIED

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CONTRACT FUNDS ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. *REPORTS CONTROL SYMBOL*

PAGE 1 OF 1 PAGES

3. DATE 12 April 57

4. TITLE (UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEMS (SYSTEM 117L) b. (SYSTEM 117L QPRI)

5. INITIAL ☐ CHANGE #1

6. NUMBER 8728

7. ABBREVIATED TITLE	8. SYSTEM PROJECT OR TASK NUMBER	9. BUDGET PROJECT SERIES	10. PRIOR YEARS *(in thousands)*	11. FY 57 *(in thousands)*	12. FY 58 *(in thousands)*	13. FY 59 *(in thousands)*	14. FY 60 *(in thousands)*	15. TO COMPLETION *(in thousands)*
System 117L QPRI	8728			12.8M	156.0M	144.0M	81.0M	
16. TOTAL				12.8M	156.0M	144.0M	81.0M	

~~B~~ 70

1.

R & D COST ESTIMATE RECAPITULATION

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. *REPORTS CONTROL SYMBOL*

PAGE 1 OF 1 PAGES

3. DATE 2 April 1957

4. UNCLASSIFIED TITLE a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L QPRI POSS)

5. INITIAL ☐ CHANGE #1

6. NUMBER 8728

ITEM		A. PREVIOUS YEARS		B. FISCAL YEAR 57		C. FISCAL YEAR 58		D. FISCAL YEAR 59		E. TO COMPLETE	
		600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER
7. CONTRACT	A. TOTAL			12.8M		156.0M		144.0M		81.0M	
	B. AVAILABLE										
	C. NEW REQ			12.8M		156.0M		144.0M		81.0M	
8. MATERIEL	A. TOTAL										
	B. AVAILABLE										
	C. NEW REQ										
9. FACILITIES											
10. MANPOWER				10M	11M	14M	20M	20M	23M	40M	44M
11. TRAINING											
12. TEST ITEMS											
13. TEST SUPPORT AIRCRAFT											
14. *SUBTOTAL*				12.8M		156.0M		144.0M		81.0M	
15. TOTAL				22.8M	11M	170M	20M	164M	23M	124M	44M

THE RAMO-WOOLDRIDGE CORPORATION
LOS ANGELES 45, CALIFORNIA

GM[illegible]
re: GM67.3-49

6

INTEROFFICE CORRESPONDENCE

TO: Col. E. N. Hall
CC: H. R. Lawrence
[redacted]
DATE: 3 May 1957

SUBJECT: Transmitting copy of GM67.3-49
FROM: R. F. Mettler

Attached to this transmittal memo is a copy of R-W Document GM67.3-49 entitled "Proposed Use of IRBM as Booster for Multi-Stage Vehicles" which you requested.

Please note that this is a preliminary document, the technical content of which has not been checked or reviewed by Dr. Dunn's office. I would suggest that questions on the technical content of this memo be referred to Mr. H. R. Lawrence.

R F Mettler
R. F. Mettler

14

Enclosure:
GM67.3-49, Secretary Copy #1 Dir under date 1 Apr 1957

Classification of this letter may be [illegible] reference to [illegible] with-drawal of the cla[illegible] enclosure.

[redacted]

[redacted]

[illegible]

WD-57-07958

FORM NO. 180-1[illegible]

JUL 23 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: AFPTRC Support of WDD Systems Development

1. In response to your comments and suggestions, further investigation reveals the Missile Research Unit, Maintenance Laboratory Field Extension Number 3, under Lt Colonel Beers is presently in being at AFBMD. QPRI Project Officers for the various missile systems will begin reporting for duty 29 July 1957. Tentative scheduling calls for the WS 117L Project Officer to report during August 1957.

2. The establishment of the Field Extension Unit and the scheduled manning of that office is in response to paragraph 2 of General Schriever's letter of 10 April 1957. A copy is inclosed for your reference.

3. Responsibility for AFPTRC conduct of the WS 117L QPRI was made by SR #5, dated 17 October 1955. Major Stanley Valcik of AFPTRC has been active as the WS 117L QPRI Project Officer for the past year. Some of the current difficulties in other missile programs, in the QPRI area, may be directly traced to a lack of appreciation of the importance of early attention to QPRI problems. Assessments of the anticipated work load in this area as meriting a resident Officer, and the timing of such an assignment was left to the discretion of the Commander, AFPTRC.

4. We have not concurred in any proposed action which has not already been implemented in AFBMD, nor which is contrary to present planning within the Field Extension Unit.

5. If manning the QPRI Project were to be made with AFBMD personnel, I personally would place higher, immediate priority on manning other projects within WS 117L. In view of the fact that manning is to be done by AFPTRC from AFPTRC personnel resources, I request your signature to the letter.

Frederic C. E. Oder
FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

1 Incl
Cy letter to AFPTRC
subject as above
with inclosures

Above ltr returned
to Col Oder 25 Jul 57.

8

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND

WDTN - WDOTA 19 November 1957

MEMORANDUM FOR WDT AND WDO

SUBJECT: (U) Joint WDTN and WDOTA Staff Visit Report to Hq ARDC on Elimination of AFPTRC as a Separate Center of ARDC

1. General: Col H. L. Evans, WDTN, and Capt A. A. Gomes, WDOTA, visited Hq ARDC on 14-15 November 1957 for the purpose of attending a conference on the elimination of the AFPTRC, and distribution of the AFPTRC functions and manpower spaces within the ARDC structure.

2. Persons Contacted: Brig Gen Flickinger, Col McKerley, Lt Col Ritter, Maj Wilcox, Maj Stobie, Maj Wertz, Dr. Gayne and Mr. Christensen.

3. Discussion and Comment: Lt Col Ritter, Hq ARDC, presented the proposed elimination of AFPTRC as a separate Center of ARDC, and the ARDC actions necessary to integrate the AFPTRC functions and manpower spaces within the ARDC organization structure. The significant items covered by Lt Col Ritter and a statement of required AFBMD actions are presented below:

a. Hq USAF has directed that the AFPTRC be eliminated as a separate ARDC Center.

b. ARDC will retain responsibility for the functions presently assigned to AFPTRC with certain reductions in the present program and manpower spaces as follows:

(1) Hq AFPTRC is to be eliminated, and the office for QPRI will be added to the human factors program at WADC.

(2) The Personnel Laboratory will remain at Lackland Air Force Base as a detachment of Hq ARDC. All future programs and projects for the Laboratory will be validated and approved by the DCS/P and DCS/D, Hq USAF.

(3) The programs and projects of the Operator Laboratory will be integrated with the work of other ARDC centers most directly concerned. The laboratory will vacate the space now occupied at Randolph Air Force Base.

(4) The programs and projects of the Maintenance Laboratory will be integrated with the Personnel Laboratory and other ARDC centers. That support furnished the AFBMD will be integrated into the AFBMD organization. The laboratory will vacate the space now occupied at Lowry Air Force Base.

(5) Hq USAF has proposed a reduction of 275 manpower spaces from the 704 spaces presently authorized AFPTRC. This will

result in a net manpower authorization of 158 spaces for the Personnel Laboratory and 271 spaces for the efforts in support of W/S development. These new manpower levels are to be effective 1 January 1958.

(6) The recommended distribution of the 271 spaces within the existing ARDC structure are as follows:

Manned Space Vehicles	30
AFAC, W/S Support	12
AFCRC, W/S Support	20
AFBMD, W/S Support	46
AFMTC, W/S Support	7
AFSWC, W/S Support	10
AFMDC, W/S Support	7
RADC, W/S Support	26
WADC, HF Laboratory) W/S Support)	113
Total Spaces	271

(7) The ARDC proposed breakout of the 46 spaces assigned to AFBMD are indicated as:

BALLISTIC SYSTEMS SUPPORT		
HF Group at AFBMD:		
Job Design & Engineering		14
1. Design Specifications	2	
2. Design Analysis	3	
3. Hardware Development Monitoring	5	
4. Personnel Evaluation	2	
5. Safety and Protection	2	
Manning Information		10
Operational QPRI		
Job Aids		6
Training Equipment Requirements		
Total		30
BMD-HF Field Extension at Cooke AFB:		
Evaluation		16

ICC Site Design - - - - - - - - - - - 3
Functional checks (Man-Machine) - - 3
Reliability and System Tests - - - 10

1. Personnel Sub-system - - - - 8
2. Safety and Protection - - - 2

Total 16

(8) The following items are noted regarding the 46 total spaces listed above:

(a) The recommended AFBMD spaces include:

26 - officers
18 - civilians
2 - airmen

(b) ARDC indicated that the spaces are separate from the emergency augmentation and FY 58 manpower requirements heretofore stated by AFBMD.

(c) ARDC indicated that the spaces are to provide for normal human factors support required for the present AFBMD mission and no additional missions in the area of human factors technical programs will be imposed on AFBMD.

(d) Two medical officers - One Occupational Health, and one Industrial Hygiene Engineer are included in the officer spaces.

(e) The total civilian spaces include support types, clerical, etc.

(f) A total of 70 human factors officer spaces exist in ARDC of which 26 or 37% have been allotted to AFBMD. ARDC requested that AFBMD consider replacing some of our officer spaces with professional civilians, if possible, in order to relieve the shortage of human factors officers in the other ARDC centers.

(9) It was agreed that AFBMD would provide Hq ARDC with the following information by 25 November 1957:

(a) Organization structure or distribution of the 46 human factor spaces into the existing AFBMD organization.

(b) Manning Information:

Functional area descriptions
Rank and civilian grade spread
Job titles
Job description

4. Required Actions:

a. WDTN and WDOT will develop the information indicated in paragraph 9 above for delivery to Hq ARDC on 25 November 1957.

b. WDTN and WDOT will ~~prepare~~ recommend an appropriate internal AFBMD policy on the integration of the human factors support function within AFBMD.

Harry L. Evans
HARRY L. EVANS
Colonel, USAF
WDTN

Anthony A. Gomes
ANTHONY A. GOMES
Captain, USAF
WDOTA

9

0900

MEMORANDUM FOR THE RECORD 31 December 1957

SUBJECT: Telephone Call from Colonel Nunziato to General Ritland

5 Year Program on Astronautics. Colonel Nunziato advised that yesterday, ARDC sent in a package on the astronautics program in which everyone was quite disappointed -- in the approach and everything else. As a result, Colonel Nunziato stated that unfortunately we have a crash program now to come up with something by Monday for General Putt as a supplemental package to the FY 58 and 59 programs. The ARDC package was not considered adequate because it didn't cover the necessary things, it didn't start from where we are at present, and it was not projected out. Some new guide lines will be given ARDC right away.

Colonel Nunziato said they were faced with coming up with something which would be a quick solution, for example, the special project and any others such as the bottom part of that one for an ICBM. They want to talk about the 117L, and perhaps using the "quicky" for a test vehicle -- what we want to do with it and how soon. ARDC will be working on the technical development and research and BMD will have the systems approach -- the complete vehicle with the exception of the X-15 and the Dinosaur; these will be included in the development and research package.

The figure for FY 58 is $668M for R&D and for FY 59, $719M R&D. They want to know how much we need over and above that and what can be done with $15 additional million toward the highest priority programs in the technical development and research areas. If we get from $15 to 25 Million in FY 58 and from $30 to 50 Million in FY 59, what would be the highest priority things we would do.

General Putt needs the above information by Monday for the Johnson hearings since the ARDC material is not usable. They want to know what we would do with the additional money and some of the characteristics -- in other words, what could be accomplished such as the bottom part of the special project for an ICBM, the special project with various kinds of heads on them, acceleration of the electronic part of the 117L, construction of the track stations, and perhaps a test vehicle program. It is not necessary that the above be in great detail. It might be said that there are a lot of other things we want to do but that they are still being reviewed. The projects mentioned are the near term things which we want to do right away. Colonel Nunziato wants the above information by Friday morning.

vl

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JOINT MESSAGEFORM

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"A—PARAPHRASE NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION."

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCTIONS

TO:

COMMANDER HQ ARDC
BALTIMORE, MARYLAND

This msg is [illegible] answer to Col. Nunziato [illegible] Gen Putt [illegible] 31 Dec 57

[redacted]

(SECRET) FROM WDG-1-2

ON 31 DEC 57, o.r. ~~COLONEL RALPH NUNZIATO~~, HQ USAF, REQUESTED AFBMD RECOMMENDATIONS FOR AN EARLY ASTRONAUTICS CAPABILITY, INCLUDING COSTS AND SCHEDULES. THIS INFORMATION IS TO BE USED BY GENERAL PUTT ON 8 JANUARY IN CONNECTION WITH THE JOHNSON HEARINGS. IN ORDER TO ACHIEVE SIGNIFICANT PERFORMANCE RESULTS DURING CALENDAR YEARS 1958 AND 1959, ALREADY DEVELOPED BOOSTERS AND GUIDANCE COMPONENTS WILL BE REQUIRED. THOR PLUS THE VANGUARD SECOND STAGE IS PROPOSED AS THE BASIC BOOSTER UNIT. WITH THIS VEHICLE, THE FOLLOWING TYPE MISSIONS COULD BE PERFORMED: A. PHOTO RECONNAISSANCE SATELLITE WITH A RECOVERABLE DATA CAPSULE. WE BELIEVE THAT

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCTI

TO:

(SECRET) FROM WDG-1-2 (CONTD)

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

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INGLEWOOD, CALIFORNIA

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SIGNATURE O. J. Ritland.

TYPED (or stamped) NAME AND TITLE

O. J. RITLAND
Brigadier General, USAF
Vice Commander

WDG-55-2

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCTIONS

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COMMANDER HQ ARDC
BALTIMORE, MARYLAND

[redacted]

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FROM:
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INGLEWOOD, CALIFORNIA

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCTIONS:

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FROM:

COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

TO:

SPECIAL INSTRUCTI

(SECRET) FROM WDG-1-Z (CONTD)

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCT

TO:

(SECRET) FROM WDG-1-2

ALL COST FIGURES ARE PRELIMINARY AND SUBJECT TO REFINEMENT.

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RELEASER
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TYPED (or stamped) NAME AND TITLE
O. J. RITLAND
Brigadier General, USAF
Vice Commander

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In reply refer to:
LMSD/36599

6 January 1958

Subject: Contract AF 04(647)-97
Proposal for Acceleration of WS-117L Program

To: Major General Bernard A. Schriever
Commander, Ballistic Missile Division
Air Research and Development Command
P. O. Box 262
Inglewood, California

Reference: (A) Letter from Gen. B. A. Schriever to Mr. L. E. Root, dtd 23 Dec 1957, WDTR 57-455 (S)

(B) WS-117L Revised Contract Cost Proposal, LMSD-2786, dtd 28 Oct 1957 (S)

Enclosure: (a) Report LMSD-2832, WS-117L Development Plan for Program Acceleration, dtd 6 Jan 1958, Cys 1-10 (S)

1. By enclosure (a) the Lockheed Missile Systems Division submits herewith a development plan and cost estimate of acceleration of the WS-117L Program using the Atlas booster plus the augmentation of this program using the Thor booster.

2. The cost, including fee, as presented in this proposal is that cost necessary to accomplish the additional work proposed in the augmentation and acceleration of the program of reference (B), the Definitive Cost Proposal negotiated between Lockheed Missile Systems Division and the Air Force during the month of November, 1957.

3. Attention is directed to the fact that the schedules presented in this proposal require immediate authorization to proceed with the items listed in the proposal as "Priority Items" and that full effort on this

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[redacted]

[redacted] [redacted]

Ref: LMSD/36599

6 January 1958

Subject: Contract AF 04(647)-97
Proposal for Acceleration of WS-117L Program

To: Major General Bernard A. Schriever

program be authorized by February 1, 1958. The Contractor will be pleased to proceed immediately with the work necessary for so important a program upon receipt of this formal authorization.

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

Original signed by L.E. Root

L. Eugene Root
Vice President and General Manager

LER:cm

cc: Asst. Air Force Plant Representative
Sunnyvale, California

[redacted] [redacted]

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LMSD-2832

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6, JANUARY 1958

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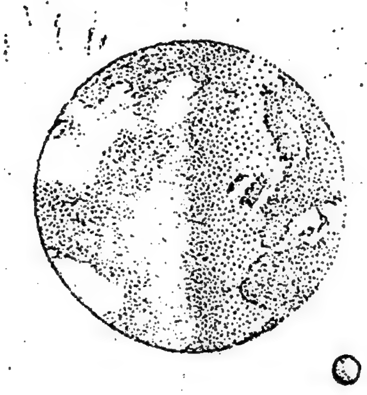

WS 117L
DEVELOPMENT PLAN FOR PROGRAM ACCELERATION

CONTRACT AF 04(647)-97

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[redacted]

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

[redacted]

INTRODUCTION

The WS-117L program now under development has as its objective the provision of complete reconnaissance systems utilizing satellite borne sensing devices. The material here represents a development plan for accelerating this program, and has been prepared by the Lockheed Missile Systems Division in its role as the WS-117L Weapon System Contractor.

In the course of negotiations on 12 to 19 November 1957 for the WS-117L definitive contract, it was requested by AFBMD personnel that Lockheed consider modification of the program for a potential acceleration. Included was consideration of increasing the tempo of vehicle firings to assure greater probability of program success and to reduce the development time scale of a first Pioneer Visual flight capability by one year to March 1960. Subsequently it was requested that consideration be given to developing the Pioneer Ferret system to a time scale comparable to that of the Visual.

In view of recent emphasis on missile weapon systems, it appeared appropriate to the Contractor to consider the inclusion of two alternate approaches in the development program: (1) The use of an IRBM missile as a booster, and (2) The physical recovery of reconnaissance photographs from the orbiting vehicle. Both approaches have been a part of the Contractor's over-all program concept from its inception but had been shelved due to initial funding limitations. The combination of the two approaches will provide a system attaining very early reconnaissance capability. This is quite similar to a method proposed recently by the RAND Corporation using the Thor as a booster and a panoramic camera, in a spin-stabilized recoverable capsule, on orbit.

[redacted]

The over-all program presented here is essentially the same as that presented to AFBMD on 27 November and 5 December 1957, but incorporates the RAND concept for early Thor-boosted reconnaissance flights.

The Contractor believes strongly that should additional funds be available for enhancement of the U. S. military program, consideration should be given to augmentation of the present WS-117L program in the manner and amount shown in Figure 1. This would allow capitalization of the established broad WS-117L base toward expeditious accomplishment of its military objectives. Expanding the vehicle firing rate from four to ~~14~~ 20 by Feb. 1960 will allow a more efficient utilization of the system, increase ultimate reliability, and bring about earlier reconnaissance capability.

9.2

[redacted]

[redacted] [redacted]

JAN 8 17 30 '58

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PLEASE CALL COLONEL HUGHES, 2224, OR LT COL BOGERT, 2224 AND ASK ONE OF THEM TO COME TO THIS MACHINE. WE WILL SEND OUR MESSAGE WHILE YOU ARE CONTACTING THEM, AND THEN STAND BY FOR THEIR REPLY. THEN WE HAVE A SECOND MESSAGE FOR MAJOR ZELINKA OR HIS ASSISTANT /INWDTR/. YOU MIGHT ALERT THEM TO BE READY AT THE MACHINE.

THE DUPUTY COMMANDER/WEAPON SYSTEMS IS PREPARING THE ARDC FIVE YEAR PROJECTED ASTRONAUTICS PROGRAM/ WEAPON SYSTEM/ FOR DELIVERY TO GENERAL PUTT WITHIN THE NEXT FEW DAYS. THE AFBMD HAD ALREADY FURNISHED MATERIAL FOR THIS PAPER. ATTACHED TO THE PAPER WILL BE A SET OF SUMMARY SHEETS SHOWING WHAT WEAPON SYSTEMS ARE IN BEING, OR PLANNED, WITHIN THE ASTRONAUTICS AREA. EACH PAGE COVERS ONE WEAPON SYSTEM, COTLINED AS FOLLOWS CLN

A. BRIEF
  1. DESCRIPTION / TWO LINES OR LESS/
  2. CAPABILITY /TWO LINES OR LESS/
  3. EXISTING TECHNOLOGY USED / TWO LINES OR LESS/
  4. PRINCIPAL TECHNICAL PROBLEMS / TWO LINES OR LESS/
B. R AND D SCHEDULE
  1. DEVELOPMENT PERIOD / SHOW END DATE/
  2. FLIGHT TEST PERIOD / SHOW END DATE/
  3. OPERATIONAL SYSTEM DELIVERY DATE
C. FUNDING /FOR FY 58 AND FY 59/
  1. P-600
  2. NON-600
  3. TOTAL

WE HAVE BEEN ASKED TO PREPARE FOUR OF THESE SHEETS ON A CRASH BASIS FOR PRESENTATION TO GENERAL ANDERSON THIS AFTERNOON. THESE SHEETS COVER
THOR

[redacted]

ATLAS
TITAN
SOLID IRBM
WE HAVE ALL THE INFORMATION WE NEED ON THOR, ATLAS, AND TITAN EXCEPT FOR THE R AND D SCHEDULE DATES. WE NEED END DATES, FOR EACH WEAPON ON DEVELOPMENT, FLIGHT TEST, AND OPERATIONAL SYSTEM DELIVERY.
IN ADDITION, WE NEED ALL THE LISTED DATA ON THE SOLID IRBM. CAN YOU MAKE THIS AVAILABLE TO US ON THIS TELETYPE WITHIN THE NEXT FEW HOURS QUES

93

MAJOR FIEKER, RDZPI, HAS BEEN DIRECTED TO PREPARE INFORMATION SIMILAR TO THAT CITED ABOVE, IN OUR MESSAGE TO COLONEL HUGHES. HERE ARE MAJOR FIEKERS QUESTIONS CLN

1. WHAT IS PRESENT FY PLAN FOR WS 117L QUES
2. PROVIDE ESTIMATE OF COSTS FOR ACCELERATED PLAN, IF NOT INCLUDED IN PRESENT PLAN FOR WS117L
3. WHAT ARE YOUR PLANS FOR A RECOVERABLE CAPSULE [illegible] SATELLITE [illegible] THE SYSTEM FOR RECOVERABLE [illegible] INITIAL CONFIGURATION [illegible] PROVIDE [illegible] PROVIDE [illegible]

[redacted]

RE THE OFFICERS THERE YET GA PLS

EGATIVE ZUJ

GR

MD
OR ITEMS B 1 AND 2 YOU ARE REFERRED TO VOLUMN 1 OF THE DEVELOPMENT
LANT DAEEEF PLAN DATED 1 OCT.

ITH RESPECT TO THE INFORMATION REQUIRED ON THE SOLID IRBM
E WILLANSWER IN 2 HOURS

HAT IS ALL FOR HERE STAND BY FOR MAJ ZENENKA

OR COL HUGHES

HAVE CHECK VOL 1 OF THE DEVELOPMENT PLAN
ND IT IS CLEAR THAT THE ATLAS , AND TITAN SYSTEM OFFICERS
USED DIFFERENT DEFINATIONS FOR THE WORD DEVELOPMENT FOR
EXAMPLE USING VOL 1 IT WOULD APPEAR THAT ATLAS DEVELOPMENT
WILL BE FINISHED ABOUT A YEAR LTE XXXX LATER THAN TITAN .
HESITATE TO SHOW THIS ON A SCHEDULE, AND THATS WHY I
OULD APPRECIATE UR VERISION OF THE DATES . I HAVE THE
AME PROBLEM WITH THE TEST DATE CAN U HELP ME QUES

A PLS

ND
KAY WILL ALSO HAVE IT AVAILABLE IN TWO HEFFE AVAILABLE IN 2 HOURS

K THANKS A LOT WE WILL STAND BY FOR MAJ ZENENKA

[redacted] [redacted]

14

WDF   6 JAN 1958

SUBJECT: Thor Program Acceleration

TO: Chief of Staff
United States Air Force
ATTN: AFOGM
Washington 25, D. C.

[redacted]

1. In accordance with Hq USAF TWX directives, AFMDC 53495 dated 2 December 1957 and AFOOP 53707 dated 9 December 1957, this Division has taken action to accelerate missile production in implementation of the 6-per-month (147 missiles) program directed on 2 December 1957. The schedules currently planned in satisfaction of these directives are attached as Inclosure 1 and differ slightly from those presented to the Secretary of the Air Force on 2 December as "Plan III." The primary change from Plan III is reflected in the continuing production of 6 missiles per month instead of reducing [illegible] as originally proposed. This change is appropriate because: (1) the operational squadrons are fully equipped at earlier dates than was possible under Plan III, and (2) continuation of the 6-per-month rate which is achieved in mid 1958 represents a more economical and efficient use of the industrial capacity available to the Air Force. Funding requirements for this program are attached as Inclosure 2 and reflect the same totals as presented on 2 December.

2. It is important to note that implementation of this Thor program does not provide for any follow-on effort as the 147 missiles are considered to be an absolute minimum for the IOC and the development, test, and training necessary to achieve this 4-squadron capability. Of the 147 missiles programmed, only 64 can be assigned to R&D as 83 are considered an absolute minimum for the IOC. The program previously recommended by AFBMD and approved by Hq USAF consisted of 175 missiles; 78 for R&D tests and 97 for training and IOC. Thus, concurrent with the acceleration of the Thor IOC dates, 28 missiles were deleted from the approved program. If additional squadrons are desired or if a continuing product-improvement program is desired, an adequate number of test vehicles are not provided. Further, the 147-missile program does not provide test vehicles for extension of the 1500-mile range.

[redacted]

[illegible]

[redacted]

3. Based on the above, the current 17 missile program is inadequate to properly accomplish the minimum Thor program objectives. It is considered that a minimum of 24 additional R&D missiles are required which will be more nearly in line with the previously approved 17 missile program. The schedule for such a program is shown in Incl. 3, and the additional funds required are indicated in Incl. 4.

4. Authority to proceed with the above program is required immediately in order that early action may be taken to satisfy long leadtime requirements. Accordingly, it is requested that AFBMD be granted approval to proceed.

SIGNED

4 Incls
1. Program Summary
2. Fund Summary
3. Programmed Schedules
4. Fund Summary (ICBM Augmentation)

B. A. SCHRIEVER
Major General, USAF
Commander

[redacted]

PROGRAM SCHEDULE

99

[redacted] [redacted]

PROGRAM SUMMARY

[illegible] December 1957

		TOTAL
1	[illegible] Deliveries (FOB DAC)	147
3	[illegible] Delivery Allocations (FOB DAC)	
5	[illegible]	64
7	[illegible]	[illegible]
9	[illegible] Purchases	
15	[illegible] Requirements' (FOB [illegible])	
17	[illegible]	23
20	[illegible] Equipment	25
21	[illegible] Dates (Squadrons [illegible] Equipped)	
24	1st Squadron	
26	2nd Squadron	
28	3rd Squadron	
30	4th Squadron	

FY 57 | FY 58 | FY 59 | FY 60

CY 56 | CY 57 | CY 58 | CY 59

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S

[redacted] [redacted]

FUND SUMMARY

Total Program Cost FY 1958-1960

	FY 58	FY 59	FY 60	TOTAL
P-100	113.3	161.8	76.9	352.0
P-200	65.4	91.2	24.7	181.3
P-300	5.5	6.0	-	11.5
P-400	2.3	7.8	2.7	12.8
P-500	3.7	6.0	12.0	21.7
P-600	2.0	2.0	-	4.0
TOTAL	192.2	274.8	115.3	582.7

98

[redacted]

[redacted]

[redacted]

FORM ATM SCHEDULE

99

TITLE

Augmented Schedules

26 December 1957

			FY 58												FY 59												FY 60					
			CY 57						CY 58												CY 59											
	Total	Prior	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1 Missile Deliveries (FOB DAC)	171	8	2	2	2	2	2	2	2	3	4	4	5	5	6	6	7	7	8	8	8	8	8	8	8	8	8	8	8	8	6	0
2																																
3 Missile Allocation (FOB DAC)																																
4 [illegible]	64	8	2	2	2	2	2	2	2	3	4	4	5	3	2	3	3	2	2	2	2	2	1	1	1	1	1					
5 SAC Augmentation	24	0															1	1	2	2	2	2	2	2	2	2	2	2	2			
6																																
7 IOC	83	0												2	4	3	3	4	4	4	4	4	5	5	5	5	5	6	6	8	6	0

[redacted]

[redacted]

[redacted]

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
Post Office Box 1395
Baltimore 3, Maryland

ADDRESS REPLY TO
COMMANDER, ARDC; ATTN:
RDTHW

13 JAN 1958

SUBJECT: Elimination of AFPTRC and Assignment of Specific Human Factors Functions to AFBMD

TO:
Commander
Air Force Ballistic Missile Division
Headquarters ARDC
Inglewood
California

1. By direction of the Chief of Staff, USAF, the Air Force Personnel and Training Research Center is being eliminated. Specific Human Factors functions in support of Weapon System development are being assigned to existing ARDC Centers for accomplishment.

2. Those functions assigned to the Air Force Ballistic Missile Division are listed in Inclosure 1 to this letter. Also listed therein are the numbers and types of spaces to be transferred to AFBMD to accomplish the described functions.

3. By direction of Headquarters USAF, the spaces assigned to AFBMD will be utilized for the accomplishment of those Human Factors functions being transferred to AFBMD.

4. Transfer of activities, spaces, and personnel will be accomplished as directed in the letter from this Headquarters, Subject: "Elimination of AFPTRC as a Separate ARDC Center," dated 10 January 1958.

5. The AFBMD plan for Integration of AFPTRC functions, dated 25 November 1957, will be returned under separate cover with appropriate comments.

6. The Confidential classification on this subject has been removed, authority Headquarters USAF DCS/D letter, Subject: "ARDC Plan for Integration of AFPTRC Weapon System Support Functions into Other ARDC Centers," dated 23 December 1957.

FOR THE COMMANDER:

Info Cy Furn
Comdr, AFPTRC

[redacted].102

HUMAN FACTORS
FUNCTIONS AND SPACES ASSIGNED
TO AIR FORCE BALLISTIC MISSILE DIVISION

AREA	SPACES OFF	 AMN	 CIV	 TOTAL	FUNCTIONAL DESCRIPTION
UTILIZATION:					
1. Job Design & Engineering Systems Application	6		4	10	To participate in development of design specifications for new weapon systems, to conduct equipment-task analyses on new weapon systems, and to monitor system development plans to insure optimal design fo the operator or maintenance man.
2. Occupational Information Systems Application	6		4	10	To identify all and to describe previously undefined Duty Positions and Air Force Specialties, to perform Qualifications Analyses for new Duty Positions and Air Force Specialties, and to prepare Proposed Manning Guides, for new Weapon Systems.
3. Job Aids Systems Application	3		3	6	To determine Class 28 Training Equipment characteristics for, to develop Position Oriented Technical Manuals and Position Oriented Performance checks for, and to apply training devices test procedures to, new weapon systems during development.
EVALUATION:					
1. Functional Checks Systems Application	2		2	4	To monitor hardware development through design evaluation of initial designs, "breadboard" models, attendance at mock-up inspections etc. and to perform evaluations of assigned personnel functions to insure man-machine compatibility during system development.

AREA	SPACES			TOTAL	FUNCTIONAL DESCRIPTION
	OFF	AMN	CIV		
EVALUATION Cont'd:					
2. Reliability Studies System Application	3		1	4	To perform personnel sub-system evaluations at appropriate points in system development and testing deriving necessary orientation and training data to insure adequate reliability of personnel in the operational environment, reporting those instances where equipment or system design imposes demands inconsistent with the degree of personnel reliability required.
3. System Tests System Application	3		4	7	(1) To accomplish man-machine testing and personnel sub-system testing of completed weapon systems to determine how effectively the system design meets human factors requirements. (2) To evaluate missile accidents and incidents to determine the extent to which human engineering in system design or personnel procedures in operation was the causal factor. From these investigations, to recommend appropriate redesign in hardware or revised procedures for operation.
4. Protection	1		2	3	To insure that adequate personnel safety and protection is provided through the incorporation of appropriate methods, procedures and safety equipment in systems and site design.
TOTALS	24		20	44	

WDTD 13 January 1958

MEMORANDUM FOR THE RECORD

SUBJECT: Long-Distance Call from Colonel Attwood - ARDC - re "Recoverable Package"

Colonel Atwood called this date with the instructions that AFBMD was to make the source selection and get the technical direction ready for the subject project and bring the story in to ARDC on 3 February as had been discussed previously. This was as a result of Generals Schriever and Anderson's discussions in Baltimore; also, the authority is being sent to AFBMD today. Colonel Norton suggested that perhaps AFBMD should wait to receive the authority from General Anderson since this was the usual method of handling such new assignments to AFBMD.

HAROLD W. NORTON
Colonel, USAF
Asst. Deputy Commander
Weapon Systems

Selection Bd

104

[redacted] [redacted]

17

MCPTA

21 January 1958

MEMORANDUM FOR THE RECORD

SUBJECT: Plan for Acceleration of the WS 117L Program

1. Location and Date: Room 235, Building 2, 14 January 1958

2. Persons Attended:

Colonel C. H. Terhune	WDT
Colonel F. C. E. Oder	WDTR
Lt Colonel J. S. Seay	MCPTA
Cmdr. R. C. Truax	WDTR
Mr. F. C. Runge	WDTR
Major R. E. Zelenka	WDTR
Mr. Jack Carter	LMSD
Mr. J. C. Wingerd	LMSD
Mr. Robert Salter	LMSD
Mr. William Holmes	LMSD

3. Introduction:

The purpose of the meeting was to discuss the acceleration of the WS 117L Program, as set forth in letter LMSD/36899 dated 14 January 1958.

4. Items of Discussion:

a. List of Preliminary Action Items for AFBMD for the Accelerated Program

Mr. Carter proceeded with the discussion of this item by going over the various actions required by AFBMD, as set forth in Attachment #1.

Item #1, Attachment #1:

It was generally agreed to outline a Memorandum of Understanding between LMSD and Convair which would suffice as a basis for drafting an agreement between Douglas Aircraft Company and Lockheed Aircraft Corporation. Mr. Carter stated that it was highly desirable to discuss the interface problem with DAC at the earliest possible moment. Colonel Terhune felt that as a preliminary measure, LMSD representatives could hold discussions with R-W personnel assigned to the WS 315A project. A meeting was tentatively scheduled for 15 January with regard to this item.

105

Item #2, Attachment #1:

Colonel Terhune stated that a meeting would be held on 16 January 1958 with representation by LMSD, Rand Corporation, the WS 117L Project Office and Hq ARDC to discuss and arrive at the approach to be used with respect to the reentry/recovery system.

[redacted] [redacted] [redacted]

[redacted] [redacted]

MCPEA
MEMORANDUM FOR THE RECORD (Contd)
SUBJ: Plan for Acceleration of the WS 117L Program

Item #3, Attachment #1:

Colonel Terhune requested that this item be deferred until such time as a schedule could be agreed upon for the accelerated program.

Item #4, Attachment #1:

Colonel Terhune stated that he did not feel it was either feasible or practical to authorize blanket sole-source procurement authority by LMSD with respect to subcontracts. In those areas where the technical approach dictated only one source available, no problem was foreseen in obtaining sole-source authority. Mr. Carter, as well as Mr. Wingard, stated that it was the contractor's objective to use competition where required. However, they felt that limited solicitation should be used.

Item #5, Attachment #1:

Lt Colonel Seay stated that the overtime restrictions for the WS 117L Program had been lifted and it could be assured that a 48-hour week could be authorized.

Item #6, Attachment #1:

It was pointed out that a request for DX priority had been submitted to Hq USAF. However, approval could be given only by the President after review by the National Security Council. A rating of No. [illegible] on the Master Urgency List had been recommended by Hq AMC and it was expected that this action would be acted upon in the very near future and would provide the necessary priority required to accomplish this accelerated program.

Item #7, Attachment #1:

No comment

Item #8, Attachment #1:

No comment

Items #9 and #10, Attachment #1:

Colonel Terhune had reservations regarding the actions requested in these two items. He stated that AMC was working on this problem with respect to quality control in order that the team concept, as used in the ballistic missile programs could be developed for the WS 117L contract.

[redacted]

[redacted]

[redacted]

MCPTA
MEMORANDUM FOR THE RECORD (Contd)
SUBJ: Plan for Acceleration of the WS 117L Program

Colonel Seay remarked that AMC has already recommended that the WS 117L Program utilize the quality assurance approach which would in turn facilitate inspection and acceptance of the contract items.

Item #11 - Attachment #1:

No comment

Item #12, Attachment #1:

Action would be taken by AMC to issue a letter contract to LMSD no later than 17 January 1958.

Item #13, Attachment #1:

No comment

5. Note: No discussion was held with respect to the list of secondary items for [illegible] for the accelerated program.

6. Facilities Required:

Lt Colonel Seay requested an explanation of the statement in the LMSD proposal which required the Air Force to furnish the contractor with facilities necessary to accomplish the program. Mr. Carter stated that the contractor felt that there would be certain items of special test equipment and machinery which would be required in order to accomplish the accelerated program. The question was asked: "Did the facilities include brick and mortar?" Mr. Carter's answer to this was that he felt that Lockheed management would request some type of brick and mortar facility. Colonel Terhune's reaction to this statement was that facilities of the brick and mortar type would be very difficult to obtain. However, the contractor should submit a list of the facility items required. Lt Colonel Seay stated that his point in discussing this question was to remind the contractor that acceptance of the proposal did not infer that all facilities requested would be granted.

7. Funds Required:

The contractor stated that the funds required to accomplish the acceleration, as well as the program already in effect, would be as set forth in Attachment #2. Colonel Terhune reviewed the sheet and asked the amount of prior year funds on this program and was given the answer that approximately $12,000,000 had been funded to this contract through June 1957. Lt Colonel Seay stated that it was his opinion that there were enough funds presently available on the WS 117L Program to carry both the current program and the

[redacted]

[redacted]

[redacted]

[illegible] FOR THE RECORD (Contd)
[illegible] for Acceleration of the WS 117L Program

[illegible] accelerated program until approximately 1 May. At that time, additional funds would probably be necessary. Colonel Terhune discussed [illegible] whether the contractor would be willing to fund the contract at [illegible] termination liability curve. Mr. Carter's reaction to this question [illegible] that for the last month of the fiscal year, he felt that LMSD would [illegible] willing to fund the contract at some point between the commitment [illegible] and the expenditure curve.

5. Flight Schedule:

The flight schedule, as proposed by the contract in LMSD Proposal [illegible] was accepted with respect to the four Thor flights beginning in [illegible] 1958. The flight, using an XSM-65 booster, was changed slightly. [illegible] resulted in moving the April flight back to May 1959 and [illegible] the June 1959 firing. It was agreed, however, that the balance [illegible] flight schedule would be discussed in a meeting to be held on [illegible] 1958 with the SM-65 Project Office.

SIGNED
JAMES S. SEAY
Lt Colonel, USAF
Chief, WS 117L Branch
Deputy Director/Ballistic Missiles
Directorate/Procurement & Production

[illegible]
Attachment #1
Attachment #2

(Col Terhune)
Attachments
(Col Oler)
Attachments

[redacted]

[redacted]

[redacted]

0118

date 21 Jan 58

[illegible]

[illegible]

[redacted]

[redacted]

109

[redacted]

[illegible] IS ACCEPTABLE TO US [illegible] OPTION AVAILABLE IN REPLACEMENT OF THAT [illegible] CAPABILITY [illegible] REVIEW OF CAPABILITIES OFFERED BY [illegible] ATTEMPT TO [illegible] TARGETS. 4. [illegible] OF THE ABOVE-MENTIONED [illegible] WILL HAVE NO [illegible] EFFECT.

[illegible] OPERATIONAL [illegible]

140

[redacted]

19

[redacted]

[redacted]

[redacted]

[illegible]

114

[redacted]

20

NFA004
RR 1 3L7456
DE RJWPNF 5F
R 222214Z [redacted]
FM HEDUSAF WASHDC
TO ZEN/COMARDC BALTO MD
INFO RJWPNFB/COMAFBMD ARDC INGLEWOOD
BT

mgt L-2
104

24 JAN 1958 04

/C O N F I D E N T I A L/CITE AFDDC-SP 55521.
THE CHIEF OF STAFF HAS APPROVED THE ACCELERATION OF 117L PROGRAM. IT IS THE INTENTION OF THIS HQ TO PROGRAM THE NECESSARY FY-58 FUNDS FOR THIS ACCELERATION WHEN THEY ARE ACTUALLY REQUIRED. IT IS UNDERSTOOD THAT 5.2 MILLION REQUIRED FOR FY-58 WILL BE FOR LOCKHEED. SINCE LOCKHEEDS CONTRACT HAS BEEN WRITTEN FOR 18 MONTHS STARTING EARLY 1958, IT IS PRESUMED THAT ACCELERATION CAN BE ACCOMPLISHED WITHOUT IMMEDIATE RE-PROGRAMMING ACTION. IT IS, THEREFORE, DIRECTED THAT YOU ACCELERATE THE PROGRAM WITHIN THE ABOVE FUND REQUIREMENTS, AND THAT THESE FUNDS WILL BE PROGRAMMED AT A LATER DATE.
BT
THIS "AC" MSG
23/0626Z JAN RJWPNF

[redacted]

[redacted]

NFA00

[redacted]

21

DISPOSITION FORM

[redacted]

FILE NO.	SUBJECT WEEKLY DIARY - 16 thru 23 January 1958		
TO MCPT	FROM MCPTA	DATE 23 Jan 58	COMMENT NO. 1

WS 117L Program

Lockheed Aircraft Corporation - L/C AF 04(647)-97

1. Definitization of Letter Contract: (UNCL)

This letter contract has been forwarded to MCPC for final review and manual approval. It is anticipated that this contract will be fully executed approximately 1 February 1958.

Lockheed Aircraft Corporation - L/C AF 04(647)-161

A new letter contract has been issued to Lockheed Aircraft Corporation to provide for the acceleration and augmentation of the WS 117L Program. This letter contract is still subject to acceptance by the contractor. The contractor's proposal contained a request for certain facilities which were not authorized by the letter contract. This is the only area where some difficulty may occur, although none is anticipated.

Overtime and Premium Wage Compensation (UNCL)

Under date of 10 January 1958, Asst Secretary Sharp, in a memorandum to the Director of Procurement and Production, HQ USAF, directed that such overtime as may be necessary to meet the approved objective of the WS 117L Program was authorized. This authorization was conveyed to the ACO to be placed into effect immediately.

Staffing of the Office of the AFPRO, Sunnyvale, for WS 117L: (UNCL)

Discussions are in progress with the AFPRO toward establishment of an adequate staff to handle the accelerated WS 117L Program. It is apparent that this office will require strengthening at an early date. In connection with this topic, MCPTR-1 has taken steps to provide specially qualified Quality Control personnel for the Lockheed plant, and for the major subsystem areas at subcontractors plants.

113

5

Operational Planning: (SECRET)

WS 117L BMD/BMO Project Office personnel convened with SAC [illegible] groups in Building 8 on 22 January to formalize a preliminary WS 117L

[redacted]

SECRET

[redacted] [redacted]

operational plan. This action is pursuant to Hq USAF TWX dated 20 January 1958 directing that SAC prepare an operational plan in accordance with the operational concept, as approved December 1957. This essentially involves the SM-65 missile as a principal booster to be launched at Cooke AFB with three possible acquisitioning and tracking stations in support. It is tentatively scheduled that the operational plan will be completed and presented to Commander in Chief, SAC during the week of 3 February 1958.

f Eugene
JAMES S. SEAY
Lt Colonel, USAF
Chief, WS 117L Branch
Deputy Director/Ballistic Missiles
Directorate/Procurement & Production

[redacted]

#11

[redacted]

[redacted] 22

[redacted]

WDTIM 28 January 1958

MEMORANDUM FOR RECORD

6+B

SUBJECT: Lockheed/Douglas WS-117L Co-ordination
Meeting, 27 January 1958

1. The initial Lockheed/Douglas WS-117L co-ordination meeting was held at Douglas Aircraft Company, Santa Monica on 27 January 1958. The purpose of the meeting was to explore the interface problem between WS-315A and WS-117L insofar as the missiles, facilities, and base operations are concerned. The senior Lockheed engineer was Mr. William O'Greene. The Douglas group was chairmanned by Mr. Mel Thomas. Colonel Cole was the senior representative from WS-117L and Colonel Greene was the senior representative from WS-315A. Mr. Kurt Pott represented STL.

The meeting started with a brief description of the 117L vehicle by Lockheed which was followed by the description of the current status of the 315A program by Douglas. The following major areas were delineated:

a. Missile Interface:

1. Structural Problems
2. Electronic Problems
3. Guidance Problems
4. Destruct Problems
5. Design Criteria
6. Separation
7. Accessories

b. Ground Handling and Facilities Modifications

c. Base Operations

115

Project engineers were appointed by Douglas (Mr. Butler) and Lockheed (Mr. Youngberry) to arrange for detailed discussions in these areas for the remainder of this week. It was recommended, and arrangements were so made, for AC Spark Plug to meet with Douglas and Lockheed on the guidance problems.

2. During the initial discussion it was agreed by Douglas and Lockheed that Lockheed would be responsible for the shroud. It was also agreed that Douglas would perform the primary dynamic [illegible] of the two [illegible] [illegible]. [illegible] plans had been previously [illegible]

[redacted] [redacted] [redacted]

[redacted] [redacted]

this week to inspect 315A launch facilities it was deemed advisable that Lockheed and Douglas meet at AFMTC to review the facilities modification picture.

3. Arrangements were made for an additional meeting to take place at AFBMD on the 4th of February to determine if any unresolved technical areas exist and to also establish an agreed schedule for the WS-315A/117L effort. During the week of 10 February a meeting will be held at AFMTC to resolve problems in the area of base operations.

SIDNEY GREENE
Lt. Colonel, USAF

Cys furn:
WDT, Col Terhune
WDER, Col Ober
R-W, Mr. Pratt

SIDNEY GREENE
Lt Colonel, USAF
Chief, Missile Development Division

[redacted] [redacted]

[redacted]

[illegible] EXCEPT PRIOR TO CATE-
[illegible] ALL INTERNAL FIL-
[illegible] GROUP PRIOR TO DECLASSIFICATION—
NPAOGS [illegible] REFERENCE IF DATE TIME GROUP IS QUOTED."

6 Feb '58

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PP INGL 7456
DE RJWPNF CF
P 061543Z
FM HED USAF WASHDC
TO COMDR AFBMD /ARDC/INGLEWOOD
INFO COM AFBMC /AMC/ INGLEWOOD
ZEN/COM.ARDC ANDREWSAFB
BT
/S E C R E T/CITE AFCGM 56224. REFERENCE AFBMD LETTER, WDP, 6 JAN
58, SUBJECT CLN THOR PROGRAM ACCELERATION. THE 171 MISSILE PROGRAM
OUTLINED THEREIN IS APPROVED AS REQUESTED. ADDITIONAL FY 58 FUND
REQUIREMENTS ARE APPROVED IN AMOUNTS AS FOLLOWS CLN  P-151
$16.5 MILLION, P-151 2.0 MILLION, P-300 3.5 MILLION SMCLN
TOTAL $22.0 MILLION. OF THE ABOVE, THE P-100 FUNDS ARE BEING
MADE AVAILABLE BY PROCUREMENT AUTHORIZATION. ACTION ON THE P-300
FUNDS WILL BE INITIATED UPON RECEIPT OF DEFINITIZED REQUIREMENTS.
THE FY 59 REQUIRE FOR AN $18.0 MILLION INCREASE IN P-131 FUNDS IS
ACKNOWLEDGED.
BT

THIS IS AN AC MESSAGE
06/2327Z FEB RJWPNF
```

DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

~~SECRET~~

Thor
Status as of 7 Feb. 58

	Missiles	Rate	FY 58 Funds
2 Dec. TWX	147	6/mo.	147.–
18 Dec. TWX	147	6/mo	188 (new total with inc of 40.6)
6 Jan. AMD letter	171	8/mo	210 (22.0 increase)
7 Feb. TWX	171	8/mo.	210

11 Feb
P.A.'s for the 22 million received on 7 Feb.
No P.A.'s yet on the 40.6 million as the [illegible] supplemental which has not yet been approved [illegible]

[redacted]

24

File Copy

12 February 1958

MEMO TO FILE

SUBJECT: THOR-117L Integration

1. A meeting was held 24 January 1958 to discuss the above subject. The following personnel attended:

Lt. Colonel R.E. Robertson	MCPTD
Lt. Colonel J. Seay	MCPTA
Major D.M. Billick	MCPTA
Capt. W. Jeancon	MCPTD
Mr. S. Lovas	MCPTD

3-3-6

2. The discussion concerned the use of a THOR missile as a booster to be used in conjunction with the 117L. Under the present plan of activating THOR squadrons, it is contemplated that five THOR missiles will be available in CY-58 over and above squadron requirements. These can be used for special projects. It was thought that perhaps four of the five missiles would be used for the project relating to the 117L. It appeared that four missiles would be made available for the proposed program on a non-reimbursable basis. Four more - and possibly six more - would be provided from the THOR production line, and the 117L Project Office would arrange to reimburse the 315A Project Office for this second group of missiles. Since the (six) missiles will be bought for production at the tail end of present contracts, it appears that funds need not be furnished to the 315A Project Office until the beginning of FY-59. The first four missiles will be of the 120 series.

3. It is contemplated that there will probably be five firings at Patrick and five at Cooke.

RESOLVED as (10) at Cooke AF

4. It will be necessary to determine what GSE will be required to support Cooke and to identify the items for which the 117L Project will give us money. Col. Seay indicated they would use one of the stands at SAC. We need to know what stand will be used.

5. It was agreed that only a matter of allocation is involved at the present time and no funds need be transferred this fiscal year. Ten missiles can be diverted from our contracts as needed.

128

6. We will need money in FY-59 and will add the six additional requirements to our third contract probably.

7. We can issue a CCN to Douglas to tell them what they must do to adapt the missile to the 117L. Col. Seay will give us a note stating exactly what is required. We will then ask Douglas what they need and when in the way of GSE.

[redacted] [redacted] [redacted]

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56 19912
~~56MCP-1569~~

Cy # 1 of 6 cys.

[redacted]

* * * * * * * * * * *

8. On 4 February another meeting was held, attended by personnel from Lockheed, Douglas, BMD and BMO. The meeting was called for the purpose of setting up some kind of work statement in connection with the THOR-117L program. A Memorandum of Understanding was desired, setting out who was to do what on the setting up of schedules. The group, excluding BMO, had had a meeting previously, and some of the items unsettled at that time were to be discussed and resolved in this meeting. It was desired to obtain certain facts which would be the basis for instructing Douglas contractually to accomplish their portion of the program. Lockheed was concerned about the weight of the missiles to be allocated for this project. They wanted the lightest missile possible and felt that the approximately 19,000 pounds of instrumentation, which would be incorporated into the missiles they were to receive, might prove to be a significant and excessive weight which might jeopardize the program. They wanted to know the exact number of the missiles to be used, and the exact weight of these missiles rather than the generalized weight and balance statement for the typical missiles involved. After considerable discussion on this point, it was agreed this information would be furnished to Lockheed. However, the missiles would be pre -138 missiles. Lockheed desired to know how many missiles would be involved. It was indicated there would be five at Patrick and five at Cooke. The ten missiles would be fired through July 1959. This represented launching time, and deliveries would have to be earlier. Only one stand would be used at Patrick consecutively for the five firings.

9. With respect to the wind tunnel program responsibility, Lockheed thought this would be their responsibility, although they would furnish the results of their efforts to BMD as well as Douglas. Douglas was satisfied to see the results of the test.

10. Douglas wanted to know if a work statement could be set up in the matter of a few days. Col. Greene and Major Wilson were to get together on this matter. Douglas was to give us its comments on a work statement right away so that these could be studied and an agreement reached. There was thought the work statement would be available and coordinated with Lockheed by the end of this week. It would be a preliminary document but fairly definitive.

[redacted]

11. With respect to the modification of facilities at Patrick, Lockheed proposed to furnish design data to Douglas who would work out with the Base the provisioning of the required facilities. Douglas was cautioned to insure that the Base would in fact provide these needs, because it would be extremely difficult to charge the cost against a supply contract.

AUTHORITY OF [illegible]
[illegible] USSLSA DTD 7-15-61 BY

12. With respect to the work statement, Douglas was also informed that if it proceeded without contractual coverage to implement the probable requirements, this would be done at its own risk. Contractor was not discouraged from doing this but simply informed of what it

[redacted] [redacted]

[redacted]

already knew - that without contractual coverage Contractor was proceeding at its own risk. It was suggested to BMD that, since this appeared to be an urgent project, a Purchase Request setting forth the requirement be hand-carried to BMO so that a letter supplement could be issued without delay. It was indicated a PR had been started covering studies which included, but were not limited to, the project under discussion. Moreover, the PR made no reference to hardware requirements. Douglas indicated it needed coverage within a week for work which would encompass production of hardware. BMD was asked to modify the PR now in process, or initiate another one which would permit BMO to act expeditiously.

13. Lockheed was interested in knowing whether they could work with AC in a manner parallel to the way they were working with Douglas. This appeared to be satisfactory to the group except that BMD would be informed of all matters under consideration so that it could take a hand as appeared appropriate. Col. Seay indicated he would like to amend the AC contract as Lockheed's contract has been amended. The same situation exists between RW-AC as between RW-DAC. A question was raised as to whether a call contract could be used covering R-W's work with Lockheed. Col. Seay was to check on this. Lockheed indicated they might need a nose section of the missile in connection with the designing of the interconnector above the interface. This matter is to be resolved. It was understood that Douglas would not investigate heat problems as this is the primary responsibility of Lockheed. AC has responsibility in connection with the guidance system. Lockheed wondered whether BMD wanted Lockheed to know what material GE is working with. They indicated Lockheed had a limited "need-to-know." It was indicated this was a slightly different area because we planned the work GE did on re-entry configuration would be subcontracted from Lockheed to GE.

14. Lockheed again stressed that weight was a serious problem. Several suggestions were discussed for reducing weight, including elimination of fins and reduction of weight in connection with the shock mount on the guidance sections, which is to be the subject of a reduction program in the future. The 100-200 pounds weight saving in connection with this latter item appealed to Lockheed. There was some question about the desirability of making this change for the sake of saving weight without trying out the modification on missiles fired prior to the time needed for this program. It seems like a considerable gamble might be involved for the weight saving gained. This was to be a matter for further discussion by the group.

3-3-6

120

15. Lockheed advised it had had a meeting at Patrick in connection with GSE. It was their opinion that there would be no particularly difficult problems which could not be solved. They outlined five or six key matters which they had had under consideration. The height problem with respect to stand 17A had been essentially licked. Lockheed had discussed GSE problems with the Base and had reached agreements on most items. They will talk to Douglas this week so that they can reach joint agreement on the items involved. Lockheed considered that Douglas would take care of any work required at the Base. It was indicated that as of yesterday no official word to AFMTC had been given regarding this program. BMD advised it expects to have a meeting next week at Patrick with test people to

[redacted]

present the entire program. BMD would also work out in conjunction with them the method of base operation, getting a Memorandum of Understanding presenting to them the specific nature and the type of modification, and determining how the Base can handle this project. Lockheed indicated they planned to go back to Patrick two weeks from tomorrow to review the particular problems they had. BMD wanted to enlarge the scope of the meeting at Patrick to cover the whole program. It was suggested that if the facility material was not available for discussion a later meeting could be set up for that. The management meeting should come soon and separately if necessary. Lockheed indicated it would design a tower as well as the lines, and Lockheed will subcontract the tower and related work. With respect to the lines running from the block house to the pad, Lockheed agreed tentatively they would order the cable and provide criteria and then Douglas and the Base would arrange for installation.

16. As a result of some discussion, Lockheed will do away with fuel and acid dump trailers. The amount of space to be made available to Lockheed was discussed. It appeared that 4 square feet required in the blocks might not be available. Lockheed thought they might be able to cut back sufficiently to fit into the space available.

17. Lockheed desired to discuss the program at Cooke but the personnel best informed in this area are currently in England. Lockheed's concern revolved around the problem whether they should re-orient or build new launchers, and whether the launchers available could be turned 60°, thereby eliminating the need for new ones. There will be another meeting tomorrow at 9 o'clock at Douglas to discuss this matter further.

[redacted]

[redacted]

[redacted]

~~58MCP-1569-~~ Cy # 1 of 6 cys.
58MCP1991E

[redacted] [redacted] 25

COPY

February 14, 1958

MEMORANDUM FOR THE SECRETARY OF DEFENSE

SUBJECT: THOR and WS-117L Program

1. Closely related to Air Force THOR and WS-117L programs are five projects, all of which, I believe, should be undertaken promptly by the Air Force. THOR boosters can be made available for these projects from 1958 authorized production without adversely affecting the IRBM program.

2. The projects are as follows:

a. THOR ICBM - An existing project to test advance ICBM nose cones is based on using THOR and a VANGUARD second stage. This combination will also provide a two-stage missile carrying a 300 lb. warhead with a range of over 5,000 miles. This missile could be provided for inventory relatively cheaply and at a cost of about $20 million more than the cost of a THOR squadron. No firm recommendation as to program on the THOR ICBM is made at this time, but it is believed operational missiles could be secured at a very early date to supplement ICBM capability, if desired.

b. Television Satellite. A small television transmitter can be installed in a satellite to provide global weather for military, commercial and scientific purposes. The THOR would be combined with the HUSTLER engine to boost the satellite to orbit. I am advised the first flight of this system can be made in September 1958.

c. Recoverable Satellite. This system could carry a variety of payloads all capable of recovery by decelerating devices. The THOR would be combined with a VANGUARD second stage to boost the satellite to orbit. Present indications are that the first flight can be made in July 1958.

122

d. Scientific Satellite. The use of THOR and the HUSTLER engine would enable the Air Force to launch a 300 lb. scientific satellite by October 1958.

e. Moon Impact. As previously recommended, the Air Force can launch a moon rocket using the THOR, VANGUARD 2 and VANGUARD 3 with an appropriate payload by October 1958. In addition to the scientific data that can be obtained from such a flight, the United States could make a major international psychological gain by beating the Russians to the Moon. I urge that this Air Force approach be utilized.

[redacted]

[redacted] [redacted]

C O P Y [redacted] [redacted]

Memo for Secy of Defense, Subj: THOR and WS-117L Program(U)

3. Regarding items 2d and e above, the Air Force can undertake their accomplishment or participate in such projects as may be deemed appropriate. I believe the dates used above should be regarded as targets and are necessarily subject to adjustment as programs proceed.

(Signed) JAMES H. DOUGLAS
Secretary of the Air Force

APPROVED (Within Air Force Resources for 1958):

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[illegible] [redacted] [illegible]
Discuss with the [illegible]
Bob

TWX 18 FEB 58

ATTN: COLONEL F C E ODER, WDTR

FROM: F. W. O'GREEN, LOCKHEED MISSILE SYSTEMS DIV PALO ALTO CALIF

SUBJ: WS 117L - RECONNAISSANCE CAPSULE

/UNCLASS/ LMSD/37545 --- PRESENT STATUS OF TECHNICAL AND CONTRACTUAL APPROVAL OF REENTRY CAPSULE IS AS FOLLOWS -

1. G E HAS BEEN SELECTED AS BEST SOURCE FOR DEVELOPMENT OF REENTRY CAPSULE.

2. FAIRCHILD HAS BEEN SELECTED AS BEST SOURCE FOR CAMERA UNIT.

3. TECHNICAL APPROACH AND CONTRACTUAL DOCUMENTS COVERING G.E. AND FAIRCHILD WORK STATEMENT WERE TRANSMITTED TO ASST A/F PLANT REP ABOUT 7 FEB, WHO IN TURN FORWARDED ABOVE INFORMATION TO BMD FOR TECHNICAL APPROVAL.

PROGRAM SCHEDULE REQUIREMENTS NECESSITATE IMMEDIATE CONTRACTUAL ACTION FOR SUPPLIERS. IT IS BROUGHT TO YOUR ATTN THAT PROGRESS IS ALREADY DELAYED BY ONE WEEK, AND IT IS URGENTLY REQUESTED THAT BMD FURNISH LMSD VIA CONTRACTING OFFICER THE NECESSARY APPROVAL OR ACTION REQUEST.

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Feb 21 1958

MEMORANDUM FOR THE DIRECTOR OF GUIDED MISSILES, OSD

I would like to refer to the memorandum addressed to you on 31 January 1958 from the Under Secretary of the Air Force concerning R&D Augmentation for the SM-75 (THOR). This memorandum is to provide more detail concerning the development effort indicated in the referenced memorandum.

It has been recognized for several years that development of a more sophisticated nose cone for the ballistic missiles would permit a higher yield-to-weight ratio and a higher degree of invulnerability. Theoretical and experimental work that has been accomplished to date by contractors to the U.S. Army and the U.S. Air Force have brought us to the position where full-scale testing is necessary to bring to fruition the advancedre-entry body. This testing can most readily be accomplished by using a THOR booster with a second stage made up of the second stage of the VANGUARD satellite launcher. This test vehicle will carry a 600-800 lb. ablation type re-entry body over trajectories whichwould be realized by growth versions of present ballistic missiles, or by follow-on developments such as the solid propellant ICBMs. In carrying out this development work, it should also be recognized that the necessary techniques and hardware will be developed whereby an ICBM adaptation of the THOR missile may be provided. It is not intended that a decision should be made now to provide ICBM versions of the THOR but, assuming successes in this development effort, a later decision may be made to provide a potentially earlier ICBM capability or a retrofit for THOR squadrons if overseas deployment is limited by base rights negotiations or if it becomes desirable from an economic point of view.

To accomplish this development program, it is necessary to increase the THOR production rate to eight missiles per month and procure modest amounts of other test material. This requires the expenditure of $22 million in FY 58 and these funds will be provided from currently available Air Force resources. Current planning indicates that approximately $18 million additional funds will be required in FY 59. We are currently preparing a revision to the Ballistic Missile Program to include this effort and will be ready to submit it to the OSD Ballistic Missile Committee in the near future. Your endorsement of this program is requested.

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s/ MALCOLM A. MacINTYRE
Under Secretary

cc: Mr. Douglas
Mr. Horner
Gen McCormick [illegible]

[redacted]

[redacted]

WDGEH

28

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Andrews Air Force Base
Washington 25, D. C.

GENERAL ORDERS)
NUMBER 11)

27 February 1958

SECTION

DISCONTINUANCE OF HEADQUARTERS, AIR FORCE PERSONNEL AND TRAINING RESEARCH CENTER. I
DISCONTINUANCE OF USAF UNIT - AMENDMENT. II
AWARD OF COMMENDATION RIBBON III
AMENDMENT. IV
STAFF ASSIGNMENT V

I. DISCONTINUANCE OF HEADQUARTERS, AIR FORCE PERSONNEL AND TRAINING RESEARCH CENTER.

1. Headquarters, Air Force Personnel and Training Research Center is discontinued at Lackland Air Force Base, San Antonio, Texas, effective 15 April 1958. Concurrently with discontinuance, this unit will revert to the control of the Department of the Air Force.

2. Personnel rendered surplus by this action will be absorbed in other units under control of the Commander, Air Research and Development Command.

3. Equipment rendered surplus by this action will revert to stocks to fill present and future requirements. Unit Authorization List Number 9137J-0000 is voided on date of discontinuance.

4. Organizational records will be disposed of in accordance with paragraph 23 of Air Force Manual 181-5.

5. Funds will be disposed of and final reports will be submitted in accordance with current regulations.

6. Authority: Department Air Force Letter, AFOMO 728K, dated 25 February 1958, Subject: Discontinuance of the Headquarters, Air Force Personnel and Training Research Center.

II. DISCONTINUANCE OF USAF UNIT - AMENDMENT.

1. So much of Section IV, General Orders Number 7, this Headquarters, this station, current series, as reads,

"1. Headquarters, 6590th Support Group (Headquarters) is discontinued at Baltimore, Maryland, effective 2 March 1958."

is amended to read,

[redacted] [redacted]

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OFFICE OF THE SECRETARY OF DEFENSE

WASHINGTON 25, D. C.

28 February 1958

MEMORANDUM FOR: SECRETARY OF THE AIR FORCE [redacted]

SUBJECT: RECONNAISSANCE SATELLITES AND MANNED SPACE EXPLORATION

1. Reference is made to the Air Force Proposal for accelerating military reconnaissance satellites and outer space vehicle projects discussed in your memorandum dated 12 November 1957, and your memorandum of 1 February 1958 requesting that continuation of the Air Force military reconnaissance project be clarified.

2. I have reviewed your proposal in consultation with the Director of Guided Missiles, The Special Assistant to the President for Science and Technology, and the Director of Central Intelligence. In our review we have been guided by the following general policy considerations:

a. The Department of Defense must be alert to avoid within and between the services any unnecessary duplication of military and scientific space projects even though some degree of risk is thereby involved, in order that funds and other resources may be available for the large variety of absolutely essential programs.

b. The scientific and engineering capabilities of each of the military departments must be used with maximum effectiveness and efficiency. No single military department should be overloaded with too many high priority, crash programs.

c. In addition to its missile programs, the Air Force is responsible for the 117L Advanced Reconnaissance System and has a recognized long term development responsibility for manned space flight capability with the primary objective of accomplishing satellite flight as soon as technology permits. It is important to achieve an adequate concentration of effort and energy within the Air Force on these programs with a minimum diversion of attention and of resources to lower priority projects.

129

3. On the basis of the foregoing general considerations as well as of more specific technical judgments, I have arrived at the following conclusions on the points raised in the two above referenced memoranda.

a. The ATLAS 117L project should be accelerated and carried forward under the highest national priority in order to attain an initial operational capability at the earliest possible date.

b. The proposed interim reconnaissance system made up of a Thor booster combined with a second stage which carries a lightweight payload in the form of a recoverable capsule, duplicates rather than complements the ATLAS 117L capability. The interim system would give only a small improvement in time over the ATLAS 117L. Moreover, the successful and

[redacted] [redacted]

continuous operation of a recoverable reconnaissance system, with the attendant requirement for search, appears infeasible from a practical and useable military point of view. Accordingly, the development of the interim system should not be pursued.

c. In order to attain early flights of the Lockheed vehicle to be employed as the second stage in the 117L system, it may be desirable for the Air Force to plan for test firings of this vehicle utilizing a THOR booster, since an adequate number of these less expensive boosters can be made available for this purpose sooner than the ATLAS booster will be available.

d. I understand that a THOR booster with a suitable second stage vehicle may be the most promptly and readily available device for experimental flights with laboratory animals. The development of such hardware is authorized, including provision for the recovery of the animals, in furtherance of the objective of manned satellite flight.

S/ Roy Johnson

DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

[redacted]

[redacted]

Message transmitted to Lock
or 7 March 1958

[redacted]

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COPY [redacted] 12 MARCH 1958

COMDR, AFBMD, INGLEWOOD, CALIFORNIA

TO: LOCKHEED AIRCRAFT CORPORATION
PALO ALTO, CALIFORNIA

~~SECRET FROM WDTR 3-18-E FOR MR. J. H. CARTER.~~ REFERENCE TWX LMSD/37305 AND LMSD/37019. HQ USAF HAS DISAPPROVED THE WS 117L RECOVERABLE RECONNAISSANCE PAYLOAD PROGRAM. YOU ARE NOT AUTHORIZED TO INCUR ANY FURTHER COSTS WITH GE OR FAIRCHILD ON WS 117L PROGRAM II A. YOUR EFFORTS IN THE USE OF THOR BOOSTED WS 117L SHOULD BE REORIENTED IMMEDIATELY. DESIRE YOU PREPARE A PLAN FOR ACCELERATION OF THE BASIC WS 117L PROGRAM THRU USE OF THOR BOOSTED FLIGHTS FOR EARLY TEST OF WS 117L. COMPONENTS INCLUDING ORBITAL FLIGHTS FOR EXERCISE OF THE GROUND SPACE COMMUNICATIONS NETWORK . PLAN SHOULD INCLUDE CONCEPT FOR RECOVERABLE CAPSULE FLIGHTS FOR AERO-MEDICAL RESEARCH PURPOSES. EVERY EFFORT SHOULD BE MADE TO ORGANIZE THIS MATERIAL FOR PRESENTATION TO ME AT THE EARLIEST POSSIBLE DATE. SIGNED SCHRIEVER.

139

O. J. RITLAND
BRIG GEN, USAF
VICE COMMANDER

[redacted]

[redacted]

[redacted]

W[illegible]-58-[illegible]

[redacted]

WDGE

13 March 1958
1630

MEMORANDUM FOR THE RECORD

SUBJECT: Call from Colonel Oder in Washington to Colonel Hamilton

Last Thursday, Colonel Oder stated, the question came up as to what BMD should do with the Johnson memorandum which terminated certain parts of his program. A TWX was written in General Schriever's office rather late in the evening going to Lockheed telling them to incur no more costs toward this end. This was transmitted from a rough copy which was subsequently typed in final form and signed by General Ritland. Both Generals and Colonel Oder were present.

The problem has arisen apparently that in the BMD side of the house they are saying that Lockheed cannot be reimbursed for these costs. Colonel Oder had understood and felt certain that the BMD office he had been working with fully understood that the intent was to reimburse Lockheed for costs up to the time of the TWX notification.

Colonel Hamilton was asked to contact Major Zelenka of Colonel Oder's office and get him to prepare a memo to General Funk which Colonel Hamilton could sign out the first thing Friday morning (14 March). The memo should say that General Schriever has reviewed this matter and it is his desire that Lockheed be covered for costs incurred up to the time of receipt of the wire; a copy of the wire should be attached.

Apparently the ACO is not going along on this and as a result, Mr. Carter has called General Ritland several times in Washington. The amount involved is around $50,000. General Schriever had told Carter go go ahead on this thing anticipating sort of favorable decision which has not been forthcoming.

Colonel Hamilton assured he would follow up on this as Colonel Oder requested.

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WDTSR 14 MAR 1958

MEMORANDUM FOR MAJOR GENERAL FUNK

SUBJECT: Reorientation WS 117L Program IIA

1. Recent decisions by DOD have resulted in a reorientation of the WS 117L Program IIA, which utilizes Thor boosters for the early phase of WS 117L. It was realized that Lockheed, General Electric, and Fairchild may have incurred costs prior to notification of the reorientation of the program.

2. Notification of the reorientation was transmitted by teletype to Lockheed on 10 March 1958. A copy of that teletype is inclosed. General Schriever has reviewed the entire matter and wishes that Lockheed, General Electric, and Fairchild be reimbursed for costs incurred up to and including the date of teletype notification.

1 Incl:
TWX - 1 pg (S)
dtd 12 Mar 58
WDTR 58-125 Incl w/data

(4)

J. L. HAMILTON
Colonel, USAF
Executive Officer

[redacted]

[redacted]

WDTR 58-137

[redacted]

WDTSR dn
Major Coleman 2791

[redacted]

[redacted]

March 19, 1958

MEMORANDUM FOR THE DIRECTOR, ADVANCED RESEARCH PROJECTS
AGENCY, OSD

SUBJECT: Air Force Man-in-Space Program

1. The total Air Force "Man in Space" Program toward a mid-1960 operational date is estimated to be as follows:

	FY 59
P-100 (Aircraft & Missiles)	82.0
P-200 (Support)	11.5
P-300 (Construction)	2.5
P-600 (R&D)	37.0
	133.0

2. If the Air Force does not receive the full fund support for the above program the following projects would be progressively undertaken with a resultant delay of the first manned capsule launch from mid-1960 to some future date:

a. $16.0 Million - For development of small-animal carrying capsules and components for use in conjunction with THOR-boosted WS-117L launches, starting in November 1958.

b. $5.0 Million - For assembly buildings, and launch pad and instrumentation modifications.

c. $30.0 Million - For man-size capsule and second stage booster design, development and test, as well as the procurement of support test vehicles.

d. $15.0 Million - For fabrication of a small number of capsules, including second stages and boosters.

[redacted]

[redacted]

[redacted]

[redacted]

e. $67 Million - For design, development, test and procurement of capsules, second stages, boosters, and support test vehicles leading to the earliest possible manned space flight.

S/ Malcolm A. MacIntyre
Under Secretary

[redacted]

[redacted]

[redacted] [redacted]

20 MAR 1958

MEMORANDUM FOR VICE CHIEF OF STAFF

SUBJECT: Man in Space Program

1. On 17 March 1958 representatives from the Air Research and Development Command presented their concept of a method to demonstrate, at the earliest possible date, a safe manned space flight. The concept envisions a manned capsule with associated equipment for escape, deceleration, guidance, control, communications and instrumentation.

2. Initial boost will be provided by either the Thor or Atlas. The Thor and Atlas would require The Titan may also be used. The Titan may be sufficient without additional stages of propulsion. additional propulsion for this program.

3. When launched on a low latitude orbit from the Missile Test Center a substantially circular orbit will be established at 200 miles. Recovery can be initiated on the first, second or twelfth orbit.

4. The program will start with a series of instrumental capsules, followed by animal tests, and at approximately twenty-six months from go-ahead the first manned orbital flight will take place.

5. The total Air Force "Man in Space" Program toward a mid-1960 operational date is estimated to be as follows:

	FY 59
P-100	62.0
P-400	11.5
P-300	2.5
P-500	57.0
	133.0

6. If the Air Force does not receive the full fund support for the above program the following projects could be progressively undertaken with a resultant delay of the first manned capsule launch from mid-1960 to some future date:

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[redacted]

[redacted] [redacted]

AFDRD-EX/ Lt Col [illegible] ses/71791/20 Mar 58

Memo for Vice Chief of Staff, Subj: Man in Space Program

a. $15.0 Million - For development of small-animal carrying capsules and components for use in conjunction with THOR-boosted WS 117L launches, starting in November 1958.

b. $5.0 Million - For assembly buildings, and launch pad and instrumentation modifications.

c. $32.0 Million - For man-size capsule and second stage booster design, development and test, as well as the procurement of support test vehicles.

d. $15.0 Million - For fabrication of a small number of capsules, including second stages and boosters.

e. $67 Million - For design, development, test and procurement of capsules, second stages, boosters, and support test vehicles leading to the earliest possible manned space flight.

s/ J. S. Mills, Maj Gen

[illegible]
Asst. Deputy Chief of Staff
Development

AFDRD-EX coord cy
✓AFDRD
AFDDC

[redacted]

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24 Mar 58

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WDTSR

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Reply to Inquiry

1. According to the Lockheed letter of transmittal, their report was prepared at the request of General Schriever. It was not initiated by the 117L office. The three-phase program referred to is described in the report, a copy of which is inclosed. The presentation at ARDC was made as a result of a direct invitation from General Flickinger to LMSD.

2. The trip discussed in Part II is being made by Major Wienberg as a member of the Long Range Planning Committee on Intelligence.

Frederic C. E. Oder
FREDERIC C. E. ODER
Colonel, USAF
Director for WS 117L

2 Incl:
LMSD 2907 (S)
dtd 11 Mar 58
Cy No. 45 - returned to WDTSR
WD 58-02045

TWX - Cite No. 03-42-06 (S)
WDSAT 58-751

When inclosures are withdrawn the classification of this correspondence will be downgraded to [illegible] in accordance with AFR 205-1.

[redacted]

WDTSR 58-163

[redacted]

[redacted] ACTION: AIDT 36

24 MAR 15 59 20 .. 58

INFO: JUDGE

[redacted]

INCL 2882 BE CAF RGTS 803
PP RJEPHFD
DE RJEPFF
P 242015Z
FM COMDR ARDC ANDREWS AFB MD /RDZPI LT COL ATWOOD/
TO COMDR AFBMD INGLEWOOD CALIF /COL ODER AND MAJ WIENBERG/
BT
/S E C R E T/CITE TWX 03-24-06. BMD TELECON 24 MAR 58.
PART I FOR COL ODER /SECRET//. THIS MORNING I ATTENDED A MEETING IN GEN FLICKINGER"S OFFICE SUBJECT "MAN IN SPACE." KELLOG OF LOCKHEED PRESENTED A THREE PHASE PROGRAM AS OUTLINED IN THEIR "WS 117L ADVANCE APPLICATIONS STUDY NO 1 LMSD-2907, 11 MAR 58." REQUEST YOU OBTAIN 10 COPIES OF THIS REPORT AND FORWARD TO ME SOONEST /BY COL APPOLD IF POSSIBLE/.

MAJ DAVID SIMON IS GENERAL FLICKINGER"S PROJECT OFFICER ON PHASE I WHICH CONTEMPLATES PUTTING A SMALL ANIMAL ABOARD THE DEC 58 AND THE FEB 59 THOR - HUSTLER COMBINATION FIRED FROM COOKE. HE WILL

PAGE UTWO RJEPFF
PROVIDE YOU SHORTLY WITH HIS SPECIFICS.

PHASE II IS A LOCKHEED PROPOSAL FOR 8 THOR BOOSTED LAUNCHES WITH BIGGER HUSTLER ENGINE BEGINNING JULY 59.

PHASE III IS A LOCKHEED PROPOSAL FOR 13 ATLAS, BOOSTED LAUNCHES BEGINNING DEC 59. THE LAST TWO BEING MANNED.

IT DOES NOT APPEAR THAT PHASES II AND III WILL BE A PART OF 117L.

PART II /UNCL/ FOR MAJ WIENBERG. I HAVE STARTED A TWX TO USAFE REQUESTING THEATER CLEARANCE FOR ATWOOD, HOLMAN, GROOM, WIENBERG AND SANDER. REQUEST YOU EXECUTE ARDC FORM 145 "REQUEST FOR OVERSEAS TDY TRAVEL" IN TRIPLICATE AND GIVE IT TO ME NEXT WEEK AT OMAHA. YOU MAY LEAVE PARAGRAPHS 12 THROUGH 16 BLANK AND I"LL FILL THEM IN FOR YOU. YOUR AMD IS AND-WRF-2PT-[illegible] AFB. YOU ARE TO REPORT TO PASSENGER TRAFFIC AT ANDREWS OPERATIONS MAY 9 PLT 1400 FOR BLUE PLATE FLIGHT. END ATWOOD.
BT
24/2016Z MAR RJEPFF

[redacted] [redacted]

PLS A [redacted]

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[redacted]

[redacted]

37

WS 117L PROJECT OFFICE

New Phone Extensions

17 Apr 1958

WDTSR

	EXT	ROOM	BLDG
Oder, Frederic C. E., Colonel Director for WS 117L	2751	234	2
Truax, Robert C., Captain (USN) Asst. Director for WS 117L	2751	232	2

WDTSRP

	EXT	ROOM	BLDG
Zelenka, Raymond E., Major Chief, Plans & Programs Division	2751	200	2
Bradburn, David D., Captain	2767	238	2
Pietz, John Jr., Major	2767	140	2
Walecka, Norbert J., Captain	2767	237	2

WDTSRE

	EXT	ROOM	BLDG
Battle, C. L., Lt Colonel Chief, System Engineering Division	2751	232	2
Austin, George E., Major	2741	223	2
Blum, Edward F., Lt Col	2741	137	2
Buzard, Frank S., Major	2594	223	2
Conway, Edward J., Major	2741	144	2
Copley, John O., Jr. Captain	2594	223	2
Fiebelkorn, John A., Captain	2098	147	2
Jones, George P., Lt Colonel	2741	136	2
Phillips, Francis O.	2594	223	2
Prentiss, Don C., Captain	2594	223	2
Schmitt, John J., Jr., Captain	2741	146	2
Troetschel, William O., Captain	2594	223	2
Wear, Thomas O., Major	2741	223	2
Wienberg, Harold F., Major	2741	135	2

WDTSRF

	EXT	ROOM	BLDG
Riepe, Quenten A., Lt Colonel Chief, Facilities & Test Division	2781	138	2
Buck, Guy P., Captain	2781	141	2
Hicks, Ben F., Captain	2781	143	2
Houghten, Richard A., Major	2781	142	2
Patton, William M., Captain	2781	143	2
Runge, Fritz C.	2781	139	2
Smith, Harry L., Major	2781	143	2

Attachment No. 1 to D. B. #76, page 1

17 Apr 58

WS 117L PROJECT OFFICE

New Phone Extensions

SECRETARIES FOR WDTSR

	EXT.	ROOM	BLDG
Hawkins, Elizabeth, Mrs.	2751	236	2
DiStefano, Jackie, Mrs.	2767	202	2
Dunn, Edith, Mrs.	2781	143	2
Gardner, Joyce, Mrs.	2767	201	2
Gilchrist, Laura, Mrs.	2741	145	2
Greiert, Dorothy, Mrs.	2767	203	2
Hollins, Dorothy, Mrs.	2751	236	2
Zimmer, Ione, Mrs.	2751	236	2

MIS 38

MEMORANDUM FOR COLONEL EVANS 23 April 1958

SUBJECT: Man in Space Responsibilities

1. General Schriever called me Sunday concerning the Man in Space responsibilities in ARDC. He mentioned General Flickinger would be given authority to act as though he were assigned to BMD in order that his influence would be felt in the Man in Space program in the future.

2. We need a memorandum for General Anderson outlining the responsibilities we are willing to give to Flickinger so he can carry out his role. Will you please draw up same. This is not so frantic that it must be done immediately when you get back but we obviously wish to complete it in time to put the operation into effect.

for C. H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Technical Operations

142

39

[redacted]

Retyped in WDGV

5 May 58

WDCG

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Bio-Medical, THOR Boosted WS 117L Program

1. This effort brings with it many problems of coordination with external activities new to our programs and procedures. Chief among these are aero-medical organizations (e.g., the School of Aviation Medicine), portions of ARDC, interested elements of Headquarters USAF, and ARPA.

2. I have directed that Colonel Sheppard insure on a continuing basis that appropriate coordination is effected and that the diverse interests of these activities are not interfering with the pace of the subject program. There is no intent by this action to dilute or abrogate the ordinary responsibilities or authority of any office in the complex in directing approved programs.

Cys furnished:
Colonel Evans
Colonel Oder

Signed

O. J. RITLAND
Brigadier General, USAF
Vice Commander

143

[redacted]

[redacted]

40

Missile Systems Division * Sunnyvale, California

6 May 1958

In Reply Refer to:
LMSD/56989
WS117L/32

Subject: Contract No. AF 04(647)-181
Biosatellite Flight Program Plan

To: Commander
Air Force Ballistic Missiles Division
Hdqtrs., Air Research and Development Command
Attn: Col. F.C.E. Oder (WDTSR)
P. O. Box 262
Inglewood, California

Reference: (A) AFBMD TWX to LMSD, dtd. 11 March 1958, (LMSD/37894)

(B) Letter Contract AF 04(647)-181, dtd. 25 January 1958, (LMSD/37125)

1. The TWX of Ref. (1) from AFBMD to LMSD redirected the efforts of the 117L program under the letter contract Ref. (2) to include biosatellite flights as secondary objectives of the IIA (Thor Boosted) portion of the program. This redirection has eliminated the requirement for development of a system suitable to the recovery of photographic film from an orbiting vehicle and replaced it with the need for developing a modified recovery technique appropriate to the support of the aeromedical explorations to be conducted in consonance with the new secondary objectives of the program.

2. Prior to the redirection of Ref. (1) a division of responsibility between prime and subcontractor had been established and a work plan approved by the USAF for accomplishment of the film recovery program. The change in the recovery aspect of the program has required a redetermination of responsibilities for the prime and subcontractors in accomplishing the redirected work and has been defined by LMSD, based on discussion with members of the USAF, as follows: LMSD will assume over-all system responsibility for all biosatellite flights incorporated into the flight program. As weapon system contractor LMSD will determine the general specifications for the subsystem, the general manner in which the subsystem will be developed, the integration of the subsystem into the program, and will select for approval of USAF subcontractors to be used. Suppo ing studies and developmental investigations will be made as necessary to estab technical validity of design and feasibility of intended flights. All phases of the program attendant to the operational recovery are considered the responsib of LMSD. It is intended to augment the capability of LMSD by the use of subco

[redacted]

[redacted]

tractors so as to permit the most expeditious achievement of the program. Subcontractor efforts will be:

- (a) Design and construction of the re-entry shell.
- (b) Design and construction of the biosatellite sealed capsule including all necessary environment control and life-support components.
- (c) Experimental animals and training as approved by the Air Force.
- (d) Biomedical data sensors, processors, and on-board recorders as approved by the Air Force.
- (e) Design and construction of recovery devices on or in the biomedical capsule.
- (f) Test program for proving satisfactory performance of the biomedical capsule.
- (g) Design and construction of ground support trailers for biomedical capsule.

3. The weapon system contractor recognizes General Electric's paramount position in this field and concurs with the Air Force direction that General Electric be made sole source subcontractor to assist in accomplishment of tasks (a) through (f) listed above. A separate subcontract will be established for accomplishment of task (g).

4. It has been requested by the USAF (meeting at LMSD between representatives of AFBMD, HDRME, and LMSD) that the aeromedical payload be included in the 2nd flight of the IIA (Thor Booster) program scheduled for December 58. It is recommended that the incorporation of this AM payload be withheld until the 3rd flight scheduled for January 59. It is further recommended that the total number of biosatellite flights be five with a possible sixth with a flight position as shown by the following schedule.

This recommendation is based on the indication by USAF that Thor boosted flights in addition to the ten presently programmed will be required to complete the USAF objectives and therefore would permit later scheduling of biosatellite flights. This will permit better utilization of the early flights in the accomplishment of the program's primary objectives, namely "proof of the basic 117L vehicle". The schedule proposed would be as follows:

Flight	1	2	3	4	5	6	7	8	9	10
Month	11/58	12/58	1/59	2/59	3/59	4/59	5/59	6/59	7/59	8/59
Obj.	117L	117L	AM	117L	117L	AM or 117L	AM	AM	AM	AM
Engine	(- - - - -JP4- - - - - -)					(- - - - - - - -UDMH- - - - - - - -				[redacted]
Fuel										

[redacted]

5. On the basis of previous discussions with members of AFBMD and on the assumption of your concurrence, LMSD is proceeding to establish subcontracts in accord with the definition of responsibilities as stated above. Early approval of the schedule shown herein is requested to permit its immediate incorporation into the program.

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

J. H. Carter, Manager
XA Weapon System Branch

JHC:FWO'G:sg

cc: Deputy Air Force Plant Representative
Sunnyvale, California

[redacted]

[redacted]

91

Bio
117L

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
Andrews Air Force Base
Washington 25, D. C.

ADDRESS REPLY TO
COMMANDER, ARDC, ATTN:
RDZGW

22 MAY 1958

SUBJECT: (U) Support of Bioastronautics Program

TO: Commander
Air Force Ballistic Missile Division (ARDC)
P. O. Box 262
Inglewood, California

1. In partial implementation of the authority granted under paragraph 3d, Memorandum for the Secretary of the Air Force from the Director, Advanced Research Projects Agency, OSD, 28 February 1958, subject, "Reconnaissance Satellites and Manned Space Exploration," and in the interests of an expeditious start to the investigation of the biomedical aspects of manned spaced flight, it is desired that steps be taken to include bioastronautics support as a secondary objective in from three to five of the planned THOR-boosted WS-117L flights which are scheduled to begin in November 1958. (SECRET) — Dec.

2. To provide you with an in-house primary biomedical technical competence and authority, Brig. General Don Flickinger is now assigned the additional duty of Special Assistant to the Commander, AFBMD for bioastronautics and as such will be responsible for the direction and coordination of all the biomedical aspects of projects assigned to your organization. In addition, two biomedical project officers are being permanently assigned to your Space Systems Division to provide necessary technical competence on a continuing basis. It is expected, of course, that you will also make use of other competent individuals and groups in the Air Research and Development Command and elsewhere in an advisory role, as needed. (SECRET)

3. In order that this biomedical work will interfere as little as possible with WS-117L development and testing, control of all aspects of this work will rest with your organization. It is further desired that in the interest of conserving time and resources, the AFBMD will, insofar as possible provide support to this work within the existing WS-117L contractual structure. (SECRET)

[redacted]

C8-120892

[redacted]

WD-58-03427

[redacted] [redacted]

B/L to AFBMD, Subject, "(U) Support of Bioastronautics Program"

4. I am directing the necessary action to provide an additional budget authorization and allotment of $449,000 of FY 1958 P-600 funds to your organization to cover the biomedical aspects of the efforts already underway in the WS-117L Program. In addition, $100,000 has been transferred from the School of Aviation Medicines' resources (line 780A-7851) to your organization. (UNCLASSIFIED)

5. It will be necessary for you to take action to insure that ARPA programs additional FY 1959 funds of all types (P-600 R&D; P-600 Operation and Management; and non-P-600 funds) to cover the cost of continued effort in the WS-117L Biomedical Recoverable Capsule activity. The FY 1959 P-600 R&D funds to be programmed for this purpose total $6 million and will cover the cost of development, design and fabrication of the recoverable capsule, animal container, instrumentation and telemetry, associated recovery equipment, conduct of the recovery operation, etc. The FY 1959 requirements for P-600 Operation and Management funds and non-P-600 funds have not been established as yet. (SECRET)

S. E. Anderson

S. E. ANDERSON
Lieutenant General, USAF
Commander

Orig to Gen Schriever
Cy to WDT/WDP "Action".
Info cy WDS.

[redacted]

[redacted]

WD-58-03427

06-120892

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Andrews Air Force Base
Washington 25, D. C.

GENERAL ORDERS)
NUMBER 18)

22 May 1958

SECTION

INSTALLATIONS. I
ANNOUNCEMENT OF DESIGNATION AND ORGANIZATION OF OFFICE OF SPECIAL ASSISTANT FOR BIO-ASTRONAUTICS TO DEPUTY COMMANDER FOR BALLISTIC MISSILES, ARDC II
AWARD OF COMMENDATION MEDAL. III
REDESIGNATION OF USAF HOSPITAL IV
GENERAL. V

I. INSTALLATIONS.

1. Announcement is made of the disposal of space comprising ARDC Headquarters Office Number 1 (Installation Number 1946) located at 9-15 West Baltimore Street, Baltimore, Maryland. Two entire buildings (84,222 square feet) held under General Service Administration Lease Number GS-03-B-4121 were released effective 5 March 1958.

II. ANNOUNCEMENT OF DESIGNATION AND ORGANIZATION OF OFFICE OF SPECIAL ASSISTANT FOR BIO-ASTRONAUTICS TO DEPUTY COMMANDER FOR BALLISTIC MISSILES, ARDC.

1. Effective 1 May 1958, the Office of Special Assistant for Bio-Astronautics to the Deputy Commander for Ballistic Missiles, ARDC is designated and organized, and BRIGADIER GENERAL DON D. FLICKINGER is appointed as Special Assistant on an additional-duty basis.

III. AWARD OF COMMENDATION MEDAL.

1. By direction of the Secretary of the Air Force, under the provisions of paragraph 29, Air Force Regulation 900-7, the Air Force Commendation Medal is awarded to the following named officers and airmen for meritorious service rendered during the periods indicated:

LIEUTENANT COLONEL JOSEPH E. KRYSAKOWSKI, 19791A
1 September 1955 thru 10 March 1958

LIEUTENANT COLONEL JONAH LEBELL, 19786A
1 August 1955 to 7 February 1958

MAJOR CLYDE S. BENSEY, 36579A
17 October 1955 to 1 March 1958

MASTER SERGEANT RAYMOND A. REYNOLDS, AF32949062
1 July 1957 to 31 December 1957

MASTER SERGEANT ARTHUR IASKOWSKI, AF16046522
17 December 1954 to 6 May 1958

IV. REDESIGNATION OF USAF HOSPITAL.

1. Effective 1 July 1958, the 3201st USAF Hospital at Eglin Air Force Base, Florida, is redesignated the USAF Hospital without change in strength, assignment or location.

2. UAL Numbers 3201 2947A and 3201 2947B are voided on date of redesignation. Equipment is authorized under UAL Numbers 0000 4857A and 0000 4857B effective 1 July 1958.

3. Authority: Letter from Headquarters USAF, dated 29 April 1958, Cite: AFCSG-31.2, Subject: Redesignation of 3201st USAF Hospital.

V. GENERAL.

1. Authority: Air Force Regulation 87-5, 3 December 1957.

FOR THE COMMANDER:

J. W. SESSUMS, JR.
Major General, USAF
Vice Commander

OFFICIAL

W. J. ATKINS
Colonel, USAF
Director Administrative Services

DISTRIBUTION:

RDSIPR	(8)	~~AFBMD~~	~~(1)~~	RDSM	(3)
RDSOP	(6)	~~RDZ-1~~	(25)	RDSP	(5)
RDSPMP	(90)	RDGP	(1)	RDAX	(2)
RDAO	(2)	RDGE	(1)	RDSO	(10)
RDSHP	(4)	Attn: Mrs Whittaker			
RDSH	(2)	Attn: Sgt. Satterfield			
WADC	(47)	RDAM	(3)	RDSTB	(2)
AFMTC	(8)	RDAR	(1)	RDST	(1)
AFPTRC	(5)	RDE	(1)	RDCSP	(4)
RADC	(23)	RDEH	(1)	RDT	(3)
AFCRC	(20)	RDIEL	(2)	RDTLD	(1)
AFFTC	(20)	RDJA	(1)	RDTA	(1)
AFMDC	(15)	RDD	(1)	RDTH	(1)
AFSWC	(37)	RDB	(24)	RDTS	(4)
AEDC	(6)	RDS	(2)	RDTR	(2)
AFPGC	(15)	RDSI	(1)	RDZ	(10)
AFOSR	(1)	RDSK	(1)	RDCSR	(1)

Dir Admin Serv, The Pentagon,
Wash 25, D. C. (2)
RDCSA (4)

J. W. SESSUMS, JR.
Major General, USAF
Vice Commander

W. J. ATKINS
Colonel, USAF
Director Administrative Services

DISTRIBUTION:
Comdr, Lackland AFB, San Antonio, Tex (5)
Comdr, AFP&TRC, Lackland AFB, San Antonio, Tex (5)
Hq, 6590th Sup Gp (Hq), Balto, Md (5) Attn: Capt Holmes
RDSPMP (18)
Comdr, AD Systems Management Off, L. G. Hanscom Fld, Bedford, Mass (5)
L/Col Elrod (RDSO) (5)
RDSOP (9)
RDAO (2)
RDSHP (2)
RDSH (2)
WADC (47)
AFMTC (8)
AFPTRC (5)
AFFTC (20)
RADC (23)
AFCRC (20)
AFMDC (15)
AFSWC (37)
AEDC (6)
AFPGC (15)
AFOSR (1)
AFBMD (1)
RDZ-1 (25)
RDGP (1)
RDGE (1)
RDAC (3)
RDAR (1)
RDE (1)
RDEH (1)
RDIEL (2)
RDJA (1)
RDC (4)
RDD (1)
RDB (24)
RDS (2)
RDSI (1)
RDSK (1)
RDSM (3)
RDSO (10)
RDSP (5)
RDSTB (2)
RDST (1)
RDCSP (4)
RDT (3)
RDTDD (1)
RDTA (1)
RDTH (1)
RDTE (4)
RDTR (10)
RDCSPP (1)
RDAX (2)
Dir Admin Serv, The Pentagon, Wash 25, D. C. (2)

128

12 Nov 58
21

43

[illegible]

[illegible]

[illegible] (1) [illegible] (2) [illegible]

[illegible]

[illegible]

a. Conduct and/or [illegible]

[illegible]

[illegible]

[illegible]

e. Maintain close liaison with [illegible]

f. Conduct special staff studies in connection with Human Factor problems.

g. Identify Human Factor problems, determine solutions and procedures to be [illegible]

[illegible]

Human Factors
PCT-S-4-6

[illegible] [illegible]

([illegible])

[illegible]

No.	Office	Position	[illegible]	Officer	Civilian
1.	[illegible]	Chief, Personnel Subsystems	8443	Lt Col	
2.		Asst Chief, Personnel Subsystems	8446	Maj	
3.		Human Factors Staff Officer	8464	Capt	
4.		Human Factors Staff Officer	8464	Capt	
5.		Human Factors Staff Officer	8464	Capt	
6.		Personnel Subsystem Specialist	[illegible]		GS-14
7.		Personnel Subsystem Specialist	0590		[illegible]
8.		Personnel Subsystem Specialist	0590		[illegible]
9.		Secretary-Stenographer	70450		GS-5
[illegible]		Secretary-Stenographer	70450		GS-4
[illegible]	[illegible]	Human Engineering Project Officer	[illegible]	Capt	
[illegible]		Asst Human Factors Project Officer	8464	Capt	
13.		Human Engineering Project Officer	[illegible]		GS-13
14.		Secretary-Stenographer	70450		GS-4
15.	[illegible]	Human Factors Project Officer	8446	Maj	
16.		Human Factors Staff Officer	8464	Capt	
17.		Secretary-Stenographer	70450		GS-4
18.	WDTWD	Human Factors Project Officer	8446	Maj	
19.		Asst Human Factors Project Officer	8464	Capt	
20.		Secretary-Stenographer	70450		GS-4
21.	WDTWI	Asst Human Factors Project Officer	8464	Capt	
22.		Asst Human Factors Project Officer	8464	Capt	
[illegible]		Secretary-Stenographer	70450		GS-4

152

24.	[illegible]	Human Factors Project Officer	[illegible]	Maj	
25.		Secretary-Stenographer	70450		GS-4
26.	[illegible]	Human Factors Project Officer	[illegible]	Maj	
27.		Asst Human Factors Project Officer	[illegible]	Capt	
28.		Personnel Subsystem Specialist	[illegible]		GS-13
29.		Secretary-Stenographer	70450		GS-4
30.	[illegible]	Human Factors Project Officer	[illegible]	Capt	
31.		Asst Human Factors Project Officer	[illegible]	Capt	
32.		Secretary-Stenographer	[illegible]		GS-4
33.	[illegible]	Human Factors Staff Officer	[illegible]	Capt	
34.	[illegible]	Human Factors Staff Officer	[illegible]	Capt	
35.	[illegible]	Civil Engineer (Architect)	[illegible]		[illegible]
36.		Mechanical Engineer	[illegible]		[illegible]
37.		Secretary-Stenographer	70450		GS-4
38.	[illegible]	Medical Officer, Industrial Medicine	[illegible]	Maj	
39.		R&D Officer, Special, Human Factors	[illegible]		[illegible]
40.		Secretary-Stenographer	70450		GS-4

AFBMD Cooke Field Unit

41.		Human Factors Staff Officer	7316 [illegible]	Maj	
42.		Human Factors Staff Officer	[illegible]	Capt	
43.		Personnel Subsystem Specialist	8596		GS-13

[redacted] [redacted]

JUNE 12, 1958

MEMORANDUM FOR THE DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

In confirmation of our discussions on 11 June 1958, you and ourselves are agreed that the FY 59 development program for Weapons System 117L will be programmed at a level requiring financial support in the amount of approximately $197 million. It is understood that the $152 million currently identified in the ARPA budget for the support of the project will be augmented as follows:

The Air Force will provide to ARPA, for application to the 117L program, $12 million currently programmed to buy THOR boosters. These boosters will be used in the early experimentation for Weapons System 117L development. An additional $8 million will be allocated to the Weapons System 117L development from resources available to ARPA. This leaves $25 million which the Air Force will provide to ARPA through reprogramming of resources in the Air Force budget and transfer of funds. Specific funds will be earmarked for this purpose prior to the time of finalization of the FY 59 spending program.

The net result, if such a program is approved by the Secretary of Defense in the request for which we will be glad to join with you, is that the program previously set forth in detail to your office and labeled as a $185 million program would be the one formally adopted. The difference between the $197 million referred to above and the $185 million is that in presenting in the past this latter program it had been overlooked that the $12 million of THOR boosters available in our budget were included. The Air Force believes that it is of the highest national importance that the program on which we have now agreed be approved and appreciates that if the program continues well it should be reviewed during the year to consider whether it might be desirable or feasible for you to request emergency funds to enable the program to be accelerated further.

Encl #1 to
AFBMC 20th meeting

Signed

Malcolm A. MacIntyre
Under Secretary

[redacted]

[illegible]

WD-58-04699

[redacted] [redacted]

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[redacted]

COPY [redacted]

DEPARTMENT OF THE AIR FORCE
Washington

Office of The Under Secretary JUN 24 1958

MEMORANDUM FOR THE CHIEF OF STAFF, USAF

On the basis of recent discussions of the program to be undertaken within the Department of Defense in furthering our knowledge of space, it has come to my attention that the availability of basic propulsion units might be a limiting factor in selecting the most desirable program. I believe it desirable that the selection of the program to be followed not be circumscribed by such a limitation. Therefore, without any commitment as to the utilization of these additional boosters, you are authorized and directed to increase the procurement of THOR and ATLAS boosters as follows:

a. Add four (4) THOR boosters, to the currently approved THOR programs; delivery to begin in December 1958 at the rate of one a month.

b. Add four (4) ATLAS-D boosters to the currently approved ATLAS procurement; delivery to begin in May 1959 at the rate of one a month.

c. Make additional funds of $8,000,000 available to ARPA so as to permit the immediate procurement of four (4) additional 117L Lockheed vehicles to be used in the support of the 117L program previously approved for FY 1959 at $197,000,000; delivery to begin in January 1959 at the rate of one a month.

See msg DEF 99994 re amendment of ARPA Order No. 9-58 providing for

At such time as the space program for FY 1959 is firm, a determination will be made as to financing responsibility for these additional boosters and they will be allocated to the appropriate program. If the situation should prove that these additional units are not required in the space program they will be absorbed within the Air Force approved program.

153

[redacted] Signed

Secretary of the Air Force

AFCGS Cont. #582794

[redacted]

Dist
WDG
WDT
WDTW
WDTWI
WDTWC

WDTSR (thru 5)
MCPT
[illegible]
[illegible]
WDC

[redacted]

WD-58-04[illegible]

HFA667

[redacted]

46

ACTION

18 JUL 1958 ROUTED TO (WDTE-(2 ea) WDTSA WDTSR)

INFO: WDG WDGY
~~WDT~~
~~WDGE~~
MCPT
WDP
WDGEH

FP INGL 2583
DE RJWZNF 7F
P 171759Z
FM OSD WASHDC
TO COMDR BMD INGLEWOOD CALIF

[redacted]

BT
S E C R E T T/DEF 944944. FROM OSD ARPA SGD JOHNSON.
ARPA ORDER NR 9-58, AMENDED JULY 17 1958, INCREASING AMOUNT TO NEW TOTAL $30700 THOUSAND, SAME FUND CITATION. THIS AMENDMENT COVERS PURCHASE OF 4 117L UPPER STAGES
BT
THIS IS AC MSC
17/2243Z JUL RJWZNF

WDSMDC-58-12

156

[redacted]

[redacted]

47

[redacted]

[redacted]

28 July 1958

WDT

MEMORANDUM FOR COLONEL RIEPE

SUBJECT: Schedule Slippage 117L Program IIA /became Discoverer/

Despite the fact that I have signed this, it seems to me this paper just outlines problems with no solutions. If we are in trouble, let's set up a date for the week of 28 July to brief Gen Schriever. Do not send this memorandum if a briefing is set up. Check with Col Curtin on this.

1 Incl
Memo for Gen Schriever
subj same

CHARLES H. TERHUNE, JR
Colonel, USAF
Deputy Commander
Technical Operations

157

[redacted]

[redacted]

[redacted]

[illegible]

[redacted] [redacted]

47

WDTSW

MEMORANDUM FOR GENERAL SCHRIEVER

SUBJECT: Schedule Slippage 117L Program IIA

1. A conference was held on 14 July between Douglas, Lockheed, WDTWT and WDTSR. The purpose of the conference was to reconcile the schedule difference between the WS 117L Development Plan for Program IIA at Cooke Air Force Base and the Douglas Aircraft Corporation launch schedule.

2. The DAC Report SM-27505 "Support and Facilities Requirements at CAFB for Supplemental Agreement #19, WS 315A/WS 117L Program" dtd 10 June 1958, indicates a "firing span" for the first launch area and [illegible] beginning mid November and extending thru December, with a six week interval between launches. During conversation it was pointed out by DAC representatives that the first date DAC was willing to commit a 117L launch was 6 December. This date was based on 20 August [illegible], completion of [illegible] installation and check out by 15 October, compatibility testing of booster and missile check out completed by 5 November.

3. Factors involved in the DAC schedule are:

a. [illegible] date of stands 1 and 2, in which DAC must install [illegible], check out the facility and run a compatibility test by the end of CY 1958. (Stands 1 and 2 are being completed late.)

b. "Inadequate" base support from CAFB. ([illegible] building and equipment.)

c. Time required to activate and de-bug a new facility, new crews and procedures.

d. The six weeks stand loading interval is based on the above plus the fact that a new configuration of missile, and an integrated operation of Thor/[illegible] crews will not have been perfected. DAC feels that this loading schedule can be improved by [illegible] to a four week loading schedule.

[redacted]

158

[redacted]

[redacted] [redacted]

[redacted]

4. Douglas Aircraft representative stated this is their best schedule for WS 117L. Only two possibilities exist for improving it:

a. Launch the 117L prior to the WS 315 demonstration. (This is not recommended because it is advantageous to the 117L to properly check out the stand ahead of time with a Thor demonstration and secondly, the availability of a 117L unit is critical if the time period is shortened too much.)

b. Look additionally into the possibility of shortening the delay into the launching of the WS 315 and the 117L, which at present time is six weeks.

c. Solicit top management at Douglas Aircraft to provide additional support to the DAC effort.

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Technical Operations

WDTSR 58-373
cy [illegible] of 2

[redacted]

[redacted]

48

DISPOSITION FORM [redacted]

SECUR. CLASSIFICATION (U/...) [redacted]

FILE NO.	SUBJECT Authorization for Type of Contract

TO MCPT FROM MCPTA DATE 30 Jul 58

W G Wiehoff/km/2712

1. The subject procurement is for nine (9) additional flights of WS 117 vanced Reconnaissance System using Thor boosters under L/C AF 04(647)-181. I proposed to procure the four (4) flights as directed by HEDUSAF immediately, remaining five (5) flights upon receipt of the appropriate directive.

2. The original D&F was based on a flight schedule at an estimated cos $95,000,000.00. It is proposed to amend the existing letter contract to prov additional flights for test purposes in a manner which will be appropriate. planned to negotiate the procurement with Lockheed Aircraft Corporation, Mis Systems Division, 3251 Hanover Street, Palo Alto, California.

3. A Determination and Finding, as attached, is requested pursuant to A 3.303(c).

Eugene S Silberman

1 Incl
D/AF D&F Authorization
for Type of Contract

EUGENE S. SILBERMAN
Contracting Officer

W - MCPTPP

[redacted]

[redacted]

-181

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~~50MCP-4790~~ Cy 1

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DD FORM 1 FEB 50 96 REPLACES NME FORM 96, 1 OCT 49, WHICH MAY BE USED.

16—61501-6

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UNCLASSIFIED

PRIORITY

X AF X

COMDR, AFBMD (ARDC)
INGLEWOOD, CALIF

COMDR, ARDC
ANDREWS AFB, MD

E.

UNCLASSIFIED FROM WDG-8-1-$

PERSONAL FOR GENERAL ANDERSON FROM GENERAL SCHRIEVER. REFERENCE MY MESSAGE WDG-7-11-E. I HAD PLANNED TO PRESENT THIS BRIEFING TO YOU NEXT WEEK WHILE IN WASHINGTON TO APPEAR BEFORE HOUSE APPROPRIATIONS COMMITTEE. SINCE THOSE PLANS HAVE BEEN CHANGED, I SUGGEST A LATER DATE. I PLAN TO MAKE SOME MINOR ORGANIZATIONAL REVISIONS TO ACCOMMODATE THE BIO-ASTRONAUTIC EFFORT TO BE ACCOMPLISHED IN CONJUNCTION WITH THE 117L PROGRAM. THIS INTERNAL ORGANIZATIONAL ADJUSTMENT IS BEING STUDIED AND SHOULD NOT REQUIRE ADDITIONAL MANPOWER AUTHORIZATIONS IF IT FIRMS UP AS PRESENTLY ENVISIONED. THE MANNING REQUIREMENTS ARE BEING STUDIED BY GENERAL FLICKINGER AND MY MANPOWER PEOPLE. I PLAN TO BE AT PATRICK COMMENCING APPROXIMATELY 13 AUGUST FOR A PERIOD OF ABOUT TEN DAYS. IF CONVENIENT TO YOU, I WOULD LIKE TO COME UP TO ANDREWS DURING THAT PERIOD WITH MY BRIEFERS. I WILL CONTACT YOU FROM PATRICK TO ARRANGE A DATE.

161

1 [illegible]

August [illegible]

WDS/[illegible]

Col Hudson
678 1 2

J. L. [illegible]
Colonel, USAF
Executive Officer

UNCLASSIFIED

CMDR, AFMDC (ARDC)

REQUEST MANPOWER ACTIONS UNDER WAY NOT BE SUSPENDED PENDING OUR BRIEFING. I WANT TO BE PRESENT AT THIS BRIEFING TO BE SURE YOU GET THE PROPER PICTURE AND SO I CAN GET YOUR PERSONAL IMPRESSIONS. I FEEL SURE THIS BRIEFING WILL SATISFY YOU THAT WE ARE CONTINUING TO TAKE A VERY HARD LOOK AT OUR MANPOWER REQUIREMENTS AND HAVE CONSTANTLY REPROGRAMMED TO THE MAXIMUM TO SATISFY NEW REQUIREMENTS.

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HQA211
PP RJWZBK
DE RJEPHQ 133

P 061938Z ZEA

FM HQ USAF WASH DC
TO RJWZBK/COMAFBMD ARDC INGLEWOOD CALIF
INFO RJEZFF/COMARDC ANDREWS AFB MD
BT
//S E C R E T//FROM AFCGM 54161
RECENT INSTRUCTIONS PASSED TO DEPT OF THE AF FROM ARPA RE WS-117L PROGRAM ARE PROMULGATED FOR YOUR COMPLIANCE.

MSG IN FOUR (4) PARTS.

PART I. PROCUREMENT OF LONG-LEAD TIME ITEMS FOR ADDITIONAL THOR-WS117L VEHICLES.

1. IN VIEW OF LONG LEAD-TIME REQUIREMENTS, IT APPEARS DESIRABLE TO AUGMENT PLANNED THOR-WS117L VEHICLE FIRING SCHEDULE AT THIS TIME. AUGMENTATION WILL CONSIST

[illegible] NOT REQUIRED [illegible]
[illegible] ENCRYPTION [illegible] PHYSICALLY RE-
[illegible] BY DAA [illegible]
[illegible] TO DECLASSIFICATION

DOWNGRADED AT 12 [illegible]
[illegible]
DECLASSIFIED. DOD DIR [illegible]

PAGE TWO RJEPHQ 180
OF 9 VEHICLES IN ADDITION TO THE 10 CURRENTLY AUTHORIZED. NEW BASIS FIRING SCHEDULETO BE 1 PER MONTH BEGINNING NOVEMBER 1958 AND 2 PER MONTH BEGINNING APRIL 1959.

2. YOU ARE AUTHORIZED AND DIRECTED TO TAKE SUCH ACTION AS NECESSARY TO PROCURE LONG-LEAD TIME ITEMS TO SUPPORT THIS FIRING SCHEDULE. MINOR ADJUSTMENTS OF THE TOTAL AND CHANGES OF ALLOCATION OF FIRINGS BETWEEN PROGRAMS MAY BE EXPECTED AS THESE REQUIREMENTS ARE REVIEWED FURTHER. BASIC INTENT FOR UTILIZATION OF ADDITIONAL VEHCILES IS BIO-MEDICAL EXPERIMENTATION, ALTHOUGH NOT AT THIS TIME LIMITED TO BIO-MEDICAL USE. SEVERAL SPECIAL PAYLOADS MAY BE SPECIFIED AT A LATER DATE TO INVESTIGATE AND MEASURE CERTAIN SUSPECTED SPACE PHENOMENA.

3. AFBMD AND LOCKHEED MISSILE SYSTEMS DIVISION WILL PROVIDE SECURE ARRANGEMENTS SO THAT THESE PAYLOADS CAN BE HANDLED ON A SENSITIVE BASIS.

4. IN CONNECTION WITH SOME POSSIBLE PAYLOADS, IT APPEARS THAT THE LOAD CARRYING CAPABILITY OF THE VEHICLE SYSTEM WILL BE TAXED. THIS IN TURN [illegible] LOW [illegible] ORBITS.

183

[redacted]

[illegible] REVISED DEVELOPMENT PLAN.
[illegible] HAS [illegible] $215 MILLION FO[illegible]
OBLIGATION [illegible] PROGRAM.
COVER THE FOLLOWING [illegible] 117L PROGRAM PRESENTED TO ARPA ON

[redacted]

[redacted]

24 JUNE 1958.

B. GEN [illegible]'S PROGRAM (SDR [illegible] L - ESTIMATED AT $7.9 MILLION).

C. $12.0 MILLION WORTH OF LONG-LEAD TIME ARTICLES NECESSARY TO ACCOMPLISH THE PROGRAM IIA AUGMENTATION PLAN REFERENCED IN PART I, THIS MESSAGE.

($13.0 MILLION IS BEING PROGRAMMED BY ARPA IN FY 1960 TO COMPLETE THE PURCHASE OF THIS AUGMENTATION PROGRAM.)

3. MR. GISE OF ARPA HAS REQUESTED THAT THE REVISED

DEVELOPMENT PLAN REFLECT THE SAME P-300 COSTS AS PRESENTED TO ARPA ON 24 JUNE 1958 ($23.4 MILLION).

4. DESIRE YOU EXPEDITE SUBMISSION OF NEW DEVELOPMENTAL AND FUNDING PLAN IN AMOUNT OF $215 MILLION TOGETHER WITH AN ASSESSMENT OF THOSE ELEMENTS OF THE PROGRAM THAT

PAGE FOUR RJEPHQ 180
COULD BE CONDUCTED ON A MORE OPTIMUM BASIS IF ADDITIONAL FUNDS WERE MADE AVAILABLE, AND THE AMOUNT REQUIRED THEREFOR.

PART III. REQUEST THIS HEADQUARTERS BE ADVISED:

1. FEASIBILITY OF MEETING NEW THOR-WS117L FIRING SCHEDULE OUTLINED IN PART I.

2. EARLIEST DATE ANTICIPATED FOR SUBMISSION OF NEW DEVELOPMENT PLAN.

PART IV. BUDGET HAS COORDINATED.
08/1948Z AUG RJEPHQ

CORRECTION PAGE THREE LINES 1-6
PART II. WS -117L DEVELOPMENT PLAN.
1. THE ARPA HAS PROGRAMMED $215 MILLION FOR OBLIGATION IN FY 1959 on behalf of THE WS 117L PROGRAM FD
2. THE TOTAL OF $215 MILLION IS INTENDED TO COVER THE FOLLOWING [illegible]
A. THE 117L PROGRAM PRESENTED TO ARPA ON

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6 Aug 1958

P 061938Z ZEX
FM HQ USAF WASH DC
TO RJWZBK/COMAFBMD ARDC INGLEWOOD CALIF
INFO RJEZFF/COMARDC ANDREWS AFB MD
BT
//SECRET//FROM AFCGM 54161

RECENT INSTRUCTIONS PASSED TO DEPT OF THE AF FROM ARPA RE WS-117L PROGRAM ARE PROMULGATED FOR YOUR COMPLIANCE.

MSG IN FOUR (4) PARTS.

PART I. PROCUREMENT OF LONG-LEAD TIME ITEMS FOR ADDITIONAL THOR-WS 117L VEHICLES.

1. IN VIEW OF LONG LEAD-TIME REQUIREMENTS, IT APPEARS DESIRABLE TO AUGMENT PLANNED THOR-WS 117L VEHICLE FIRING SCHEDULE AT THIS TIME. AUGMENTATION WILL CONSIST OF 9 VEHICLES IN ADDITION TO THE 10 CURRENTLY AUTHORIZED. NEW BASIS FIRING SCHEDULE TO BE 1 PER MONTH BEGINNING NOVEMBER 1958 AND 2 PER MONTH BEGINNING APRIL 1959.

2. YOU ARE AUTHORIZED AND DIRECTED TO TAKE SUCH ACTION AS NECESSARY TO PROCURE LONG-LEAD TIME ITEMS TO SUPPORT THIS FIRING SCHEDULE. MINOR ADJUSTMENTS OF THE TOTAL AND CHANGES OF ALLOCATION OF FIRINGS BETWEEN PROGRAMS MAY BE EXPECTED AS THESE REQUIREMENTS ARE REVIEWED FURTHER. BASIC INTENT FOR UTILIZATION OF ADDITIONAL VEHICLES IS BIO-MEDICAL EXPERIMENTATION, ALTHOUGH NOT AT THIS TIME LIMITED TO BIO-MEDICAL USE. SEVERAL SPECIAL PAYLOADS MAY BE SPECIFIED AT A LATER DATE TO INVESTIGATE AND MEASURE CERTAIN SUSPECTED SPACE PHENOMENA.

3. AFBMD AND LOCKHEED MISSILE SYSTEMS DIVISION WILL PROVIDE SECURE ARRANGEMENTS SO THAT THESE PAYLOADS CAN BE HANDLED ON A SENSITIVE BASIS.

4. IN CONNECTION WITH SOME POSSIBLE PAYLOADS, IT APPEARS THAT THE LOAD CARRYING CAPABILITY OF THE VEHICLE SYSTEM WILL BE TAXED. THIS IS TURN WILL DICTATE LOW ALTITUDE ORBITS.

165

PART II. WS117L DEVELOPMENT PLAN.

1. THE ARPA HAS PROGRAMMED $215 MILLION FOR OBLIGATION IN FY 1959 ON BEHALF OF THE WS 117L PROGRAM.

2. THE TOTAL OF $215 MILLION IS INTENDED TO COVER THE FOLLOWING:

[redacted] [redacted]

WDSMCC-58-2109
Series B
Cy 1 of 2

[redacted]

C O P Y

[redacted]

[redacted]

106495
REC'D WDDARDC
ACTION WDTSR
6 Aug 58

PAGE TWO
P 061938Z ZEX
FM HQ USAF WASH DC
TO RJWZBK/COMAFBMD ARDC INGLEWOOD CALIF

PART II. (CONTINUED)

A. THE 117L PROGRAM PRESENTED TO ARPA ON 24 JUNE 1958.

B. GEN FLICKENGER'S PROGRAM (SUBSYSTEM L - ESTIMATED AT $7.9 MILLION).

C. $18.0 MILLION WORTH OF LONG-LEAD TIME ARTICLES NECESSARY TO ACCOMPLISH THE PROGRAM IIA AUGMENTATION PLAN REFERENCED IN PART I, THIS MESSAGE.

($13.0 MILLION IS BEING PROGRAMMED BY ARPA IN FY 1960 TO COMPLETE THE PURCHASE OF THIS AUGMENTATION PROGRAM.)

3. MR. GISE OF ARPA HAS REQUESTED THAT THE REVISED DEVELOPMENT PLAN REFLECT THE SAME P-300 COSTS AS PRESENTED TO ARPA ON 24 JUNE 1958 ($23.4 MILLION).

4. DESIRE YOU EXPEDITE SUBMISSION OF NEW DEVELOPMENTAL AND FUNDING PLAN IN AMOUNT OF $215 MILLION TOGETHER WITH AN ASSESSMENT OF THOSE ELEMENTS OF THE PROGRAM THAT COULD BE CONDUCTED ON A MORE OPTIMUM BASIS IF ADDITIONAL FUNDS WERE MADE AVAILABLE, AND THE AMOUNT REQUIRED THEREFOR.

PART III. REQUEST THIS HEADQUARTERS BE ADVISED:

1. FEASIBILITY OF MEETING NEW THOR-WS117L FIRING SCHEDULE OUTLINED IN PART 1.

2. EARLIEST DATE ANTICIPATED FOR SUBMISSION OF NEW DEVELOPMENT PLAN.

PART IV. BUDGET HAS COORDINATED.

WDSMCC-58-2109
Series 5
Cy 1 of [illegible]

[redacted]

[redacted] [redacted]

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HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
Andrews Air Force Base
Washington 25, D. C.

ADDRESS REPLY TO
COMMANDER ARDC ATTN

RDTH

12 August 1958

SUBJECT: Responsibilities of School of Aviation Medicine in the ARDC Biosatellite Program, Subsystem L WS-117L

TO: Commander
Air University
Maxwell Air Force Base
Alabama

1. Pursuant to the directive of the Commander, Air Research and Development Command that all USAF biomedical resources be used in support of subject program, agreements have been reached between representatives of Headquarters Air Research and Development Command, Headquarters United States Air Force, Air University (Headquarters School of Aviation Medicine), Air Force Missile Development Center, and Wright Air Development Center, concerning technical responsibilities to be assigned to the School of Aviation Medicine.

2. As the result of the meeting referenced in paragraph 1, the inclosed statement of policy is hereby published as Supplement No. 1 to the letter from this headquarters, RDTHA, dated 6 June 1958, subject: Biomedical Aspects of the Ballistic Missile Program. Provisions of paragraph 4, referenced letter, in conflict with policy letter for subsystem L, will be disregarded.

FOR THE COMMANDER:

[illegible] I. WASSELL
[illegible], USAF
[illegible] Research
[illegible]

1 Incl
Supplement No. 1, Hq ARDC
Letter, 6 Jun 1958, subj:
Biomed Aspects of Ballistic
Missile Program, 8 Aug 1958
(S)

attached to ltr 6 June 58

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[redacted]

58-31,17[illegible]

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COORDINATION SHEET

[redacted]

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WDZG

SEP 4 1958

SUBJECT: Contract 04(647)-181, Internal Air Force Responsibilities Concerning Biosatellite Program.

TO: Lockheed Aircraft Corporation
Missile Systems Division
ATTN: Mr. J. H. Carter
3251 Hanover Street
Palo Alto, California

[redacted]

1. The following Air Force internal agreements concerning the Biosatellite Program technical responsibilities to be assigned to the School of Aviation Medicine and the Bioastronautics Division are furnished for your information and guidance.

a. The Bioastronautics Division (BAD) has been given integrated responsibility for all animal biomedical programs and will act as technical director to the contractor on biomedical aspects.

b. Biomedical consultation will be provided to the contractor by the Air Force consultants. Use of non-Air Force biomedical consultation will be held to an absolute minimum and use of such consultants, when necessary, will be approved by Air Force.

c. The School of Aviation Medicine will provide to the contractor, via the Bioastronautics Division, environmental criteria, biomedical objectives and limits, experimental design, data to be collected and technical approaches to be used. However, if these criteria cannot be provided in time to meet the contractor's deadlines, BAD will initiate action to secure such criteria from other available sources.

d. The School of Aviation Medicine will consult on biomedical test programs and evaluate biomedical test results.

e. The School of Aviation Medicine will provide continuous physiological and biomedical technical direction, liaison and consultation to the contractor as these are related to the biomedical aspects of the experiments. Any changes resulting from this liaison which would [illegible] cost or time [illegible] contractor [illegible]

MCPTA
CUV

DATE OF DISTRIBUTION

Record

[redacted]

COORDINATION SHEET [redacted]

2. Direct contact is [illegible] between [illegible] and contractor, and [illegible] of [illegible] will be provided to BAD and [illegible].

3. The above does not change the fact that the WS 117L Project Office ([illegible]) has responsibility for non-medical aspects of Subsystem L and is Lockheed's official contact point with the Air Force.

SIGNED
FREDERIC C. E. ODER
Colonel, USAF
Director for WS 117L

Copies furnished:
AFPR, LMSD
ATTN: Mr. J. McLachlin
Sunnyvale, California

WDTSL/BAD

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Sept 58

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WDTSG [illegible]

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WDTSL
- 20 Aug
[illegible] Johnson
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TEMPORARY
PERMANENT
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ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D.C.

ARPA Order No. 17-59

18-59-?

Sept. 4, 1958 Date

responsibility Redirected to Bou DR ARDC See Amend 1 29 Sep 58

TO: Commanding General
Ballistic Missiles Division, ARDC
Los Angeles, California

1. Pursuant to the provisions of DoD Directive 5105.15, dated February 7, 1958, you are requested to proceed at once on behalf of the Advanced Research Projects Agency with the project specified below. Additional details and directives will be issued by ARPA from time to time and will become a part of this Order when so specified.

2. You are directed to provide two complete Thor Able 1 configuration vehicles for space project launchings ~~in January and February 1959.~~ The estimated cost for these two vehicles excluding payload, is $4,840,000. See Amend #2 17 Oct 58

3. ~~You are also directed to initiate additional procurement of two second stages and two third stages for use as later directed by ARPA.~~ See Amend. #2

4. You will submit as soon as possible for review and approval by the Advanced Research Projects Agency a detail development and related financial plan covering the program. These data shall include a time-phased schedule of work and estimates for work to be performed (a) by BMD, (b) by contract, and (c) at other Government facilities. In preparing the development plan, the relative emphasis on the segments of this work should be discussed with ARPA.

5. This Order makes available $4,840,000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects, Department of Defense" for obligation by the Ballistic Missiles Division on behalf of the Advanced Research Projects Agency only for purposes necessary to accomplish the work specified herein. These funds are immediately available for direct obligation and for use in reimbursing the BMD for costs incurred under this Order. Upon approval of development and financial plans, as required herein or in accordance with amendments to this Order, these funds will be increased as appropriate.

see amend #3 26 Nov 58

[redacted]

[redacted]

Reg # 1021499

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[redacted]

[redacted]

PRIORITY
PRIORITY X

[redacted]

COMDR AFBMD INGLEWOOD CALIF

COMDR PACIFIC MISSILE RANGE, NAMTC, POINT MAGU, CALIF

INFO: AIR FORCE LIAISON OFFICE, PACIFIC MISSILE RANGE, POINT MAGU, CAL.

SECRET FROM WDTWI-9-24-E

INFO FOR COL CURTIS, PMR. THIS INFORMATION IS SUBMITTED TO SUBSTANTIATE DATE FOR INITIAL SM-75 THOR LAUNCH FROM CAPE AND TO SUBMIT PRELIMINARY LAUNCH PARAMETERS AND OBJECTIVES OF THIS LAUNCH. CURRENT SCHEDULED DATE FOR FIRST THOR LAUNCH FROM CAPE IS 30 NOV 58. CURRENT PLANNING CALLS FOR THE MISSILE TO BE ORIENTED ON THE LAUNCHER ON AN AZIMUTH OF 261 DEGREES TRUE AND ROLLED DURING THE FIRST TEN SECONDS OF FLIGHT TO AN INITIAL LAUNCH AZIMUTH OF 249 DEGREES TRUE. IMPACT WILL OCCUR AT 25 DEGREES 26 MINUTES NORTH LATITUDE AND 143 DEGREES 36 MINUTES WEST LONGITUDE AT A RANGE OF APPROXIMATELY 1313 NAUTICAL MILES. THE IMPACT LOCATION SHOULD BE DETERMINED TO THE ACCURACY OF THE INSTALLED SONAR NETWORK FOR THE IRBM IMPACT AREA.

24 SEP 1958

[redacted]

WDTWI

[illegible] R [illegible], Actg Chief, Airborne Sys Div [illegible]
10/1 1 2

[redacted]

WDTWI: 58-[illegible]

Copy 1 of 7 copies

CMDR AFBMD INGLEWOOD CALIF [redacted] [redacted]

TRAJECTORY RUNS WILL ALSO BE MADE FOR AN ALTERNATE IMPACT POINT ON AN INITIAL FLIGHT AZIMUTH OF APPROXIMATELY 251 DEGREES TRUE AND WITH A RANGE OF APPROXIMATELY 1275 NAUTICAL MILES. PRIMARY OBJECTIVE FOR THIS FIRST FLIGHT WILL BE TO DEMONSTRATE THE PERFORMANCE OF THE THOR WEAPON SYSTEM UTILIZING OPERATIONAL PROCEDURES AND EQUIPMENT TO THE MAXIMUM EXTENT POSSIBLE. ANY COMMENTS OR RESERVATIONS YOU MAY HAVE RELATIVE TO PROVIDING THE REQUIRED RANGE SUPPORT TO MEET THESE CURRENT PLANS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THIS [illegible] DIVISION, ATTENTION, WDTWI.

Copies furnished:
  WDTD, Attn: Col Porter
  DWI (SAC-MIKE) Attn: Col Woodward

WDTWI-58-146

[redacted]

WDTWI of 2 2

Maj Randall 1071

Copy 6 of 7 copies

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D.C.

ARPA Order No. 17-59
Amendment No. 1

Sept 29, 1958 Date

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D. C.

ARPA Order No. 17-59, dated September 4, 1958, is hereby amended to redirect the responsibility for its execution from the Commander, Air Force Ballistic Missiles Division, ARDC, to the Commander, Air Research and Development Command.

Roy Johnson

Roy W. Johnson
Director

cc: Secretary of the Air Force
Commander, AFBMD, ARDC

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Opn file [illegible]

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D. C.

ARPA Order No. 17-59

Amendment No. 2

October 17, 1958 Date

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D. C.

Paragraph 2 of ARPA Order No. 17-59, dated September 4, 1958, is hereby changed by deleting the words "in January and February 1959." Paragraph 3 of this Order is deleted in its entirety.

The purpose of this amendment is to permit the vehicles scheduled in January and February to be made available to NASA. It is understood that they will place their own order for those vehicles.

ARPA Order No. 17-59 as herein amended provides for the delivery of two complete vehicles to ARPA and includes the funds therefor.

You are requested to submit as soon as possible a schedule of availability of the vehicles herein ordered.

Roy W. Johnson

Roy W. Johnson
Director

cc: Secretary of the Air Force

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[redacted]

[redacted]

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D.C.

mgt 1-2 51

[redacted]

NOV 25 1958

Sir:

In confirmation of my recent conversation with General Schriever of AFBMD, it is ARPA's desire, and you are hereby requested, to revise that portion of the DISCOVERY test series which deals with biomedical payloads. Of the five originally programmed launchings, it is now planned to eliminate two of the small primate shots. This leaves two mouse containing payloads and one small primate payload. The two vehicles freed by this change shall be reassigned to the launching schedule requested in our ARPA Order 17, as amended.

Additional changes in the DISCOVERY program are being formulated in accordance with budget level considerations. These changes will be brought to your attention as soon as they are finalized by issuance of an approved scope of work.

Sincerely,

Roy W. Johnson

Roy W. Johnson
Director

Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D.C.

[redacted]

cc: Secretary MacIntyre
General Schriever

[redacted]

[redacted]

CS- 26569

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5-1709-13

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O/R 58

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D. C.

ARPA Order No. 17-59

Amendment No. 3

November 26, 1958 Date

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D. C.

ARPA Order No. 17-59, dated September 4, 1958, as amended, is hereby further amended as follows:

1. Provide for the delivery of an additional eight Thor-based vehicles and two Atlas-based vehicles. The attached inclosure depicts the desired vehicle capacity for these vehicles as well as the capacity for the two Thor-Able vehicles (Nos. 1 and 3) purchased under Amendment No. 2, dated October 17, 1958. The latter two vehicles are assigned to the navigation and cloud cover programs of ARPA.

See amend # 8, 10 apr 59

2. Submit within 30 days a development and related financial plan for the above program for review and approval by ARPA. A separate development and financial plan shall be submitted for the two vehicles procured under Amendment No. 2. The development plans should include the earliest possible launching dates as well as your recommendations and estimated costs for systems integration assuming that payloads will be provided.

3. Study the necessity for constructing a new Thor launching stand in support of the above program in the general area of the present Vanguard site (Launch Stand 18A). The receipt of this study prior to the receipt of the financial and development plans would be desirable.

4. Pursuant to paragraph 7 of ARPA Order No. 17-59, dated September 4, 1958, reporting on this Order will be accomplished by

[redacted]

UPON REMOVAL OF ATTACHMENTS THIS DOCUMENT BECOMES UNCLASSIFIED

[redacted]

C8-125683

submission of monthly progress report. This report, which is to be submitted in accordance with procedures outlined in Attachment No. 1, represents ARPA's total foreseeable requirement for recurring reports based on this Order.

5. The fund availability under ARPA Order No. 17-59 is hereby increased from $4,840,000 to $5,090,000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects Agency, Office of the Secretary of Defense." This increase will provide partial funding for the work assigned above.

for J E Clark
Roy W. Johnson
Director

2 Incls.: (Address only)
Attachment No. 1
Veh. Requirements List

cc: Secretary of the Air Force

[redacted]

CP-125683

Attachment No. 1 to
Amendment No. 3

ARPA Order No. 17-59

PREPARATION OF MONTHLY PROGRESS REPORT

This report will be submitted in two parts, a Narrative Section and a Milestone Progress Section.

Narrative Section. A letter report will be prepared each month by the addressee of the above numbered ARPA Order, giving a narrative account of work performed under the Order. The initial report will cover the period through December 1958. Subsequent reports will cover work performed during each month thereafter. The report will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and is due within 10 days following the close of the month reported. The ARPA Order number and subject of the project should be stated in the heading of each report.

The report will be in letter form and generally not exceed three pages in length. It will present a narrative summary of work performed, including technical status, major accomplishments, problems encountered, future plans, and any action required by ARPA. The initial report should include an introductory preface outlining the background, objectives, and assignment of responsibility for the project. All reports should include photographs and illustrations as appropriate.

Milestone Progress Section. Instructions for preparation of this section, which requires use of a standard format in reporting actual progress against planned progress in accomplishing major milestones, will be issued at a later date.

[redacted]

VEHICLE REQUIREMENTS

	Vehicle	Desired Launch Date	Payload Gr. Wt. (lb.)	Orbital Altitude (NMI)	Launching Azimuth (°)	Stabilization Type
1.	Thor-Able*	May '59	225	500	44	Spin
2.	Thor-based	Aug. '59	350	300	44	Spin
3.	Thor-Able*	Sep. '59	225-350	500-300	44	Spin
4.	Thor-based	Oct. '59	240	250	180	Complete
5.	Thor-based	Oct. '59	350-650	300-400	45	Spin
6.	Thor-based	Nov. '59	650	300	45	Spin
7.	Atlas-based	Dec. '59	500	19,000	90	Rough
8.	Thor-based	Jan. '60	650	300	45	Rough
9.	Thor-based	Feb. '60	350	500	180	Rough
10.	Thor-based	Mar. '60	300	250	180	Complete
11.	Thor-based	Mar. '60	240-300 (350)	250 (500)	180	Complete
	Atlas-based	Apr. '60	Backup for 6, 7, or 8			Rough

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*These vehicles were ordered by ARPA Order No. 17-59, Amendment No. 2; No. 1 is designated for navigation satellite and No. 3 is designated for a cloud cover satellite.

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FM COMARDC ANDREWS AFB MD
TO COMAFBMD ARDC INGLEWOOD CALIF
BT
/S E C R E T/ FROM RDZGW-11-39-E.

FOR WDGE, COL HAMILTON SMCLN INFO WDZ, COL CURTIN, WDZD, COL SHEPPARD, WDZW, COL EVANS. THE FOLLOWING LETTER FROM MR JOHNSON, ARPA, TO COMDR ARDC IS FORWARDED FOR YOUR ACTION. ADDITIONAL COPIES ARE BEING SENT TO YOU BY MAIL. QUOTE CLN SIR, IN CONFIRMATION OF MY RECENT CONVERSATION WITH GENERAL SCHRIEVER OF AFBMD, IT IS ARPAS DESIRE, AND YOU ARE HEREBY REQUESTED, TO REVISE THAT PORTION OF THE DESCOVERY TEST SERIES WHICH DEALS WITH BIOMEDICAL PAYLOADS. OF THE FIVE ORIGINALLY PROGRAMMED LAUNCHINGS, IT IS NOW PLANNED TO ELIMINATE TWO OF THE SMALL PROMATE SHOTS. THIS LEAVES TWO MOUSE

PAGE TWO RJEZFF 19C

CONTAINING PAYLOADS AND ONE SMALL PRIMATE PAYLOAD. THE TWO VEHICLES FREED BY THIS CHANGE SHALL BE REASSIGNED TO THE LAUNCHING SCHEDULE REQUESTED IN OUR ARPA ORDER 17, AS AMINDED. PARA. ADDITIONAL CHANGES IN THE DISCOVERY PROGRAM ARE BEING FORMULATED IN ACCORDANCE WITH BUDGET LEVEL CONSIDERATIONS. THESE CHANGES WILL BE BROUGHT TO YOUR ATTENTION AS SOON AS THEY ARE FINALIZED BY ISSUANCE OF AN APPROVED SCOPE OF WORK, SINCERELY, ROY W. JOHNSON UNQUOTE LETTER IS DATED 25 NOV 58.

BT
26/2110Z NOV RJEZFF
PLS ACK1 MSG
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ADVANCED RESEARCH PROJECTS AGENCY
Washington 25, D. C.

4 December 1958

MEMORANDUM FOR THE SECRETARY OF THE AIR FORCE
Attn: The Under Secretary of the Air Force

Info
X Dissemination

SUBJECT: WS-117L Program

As announced yesterday, ARPA has inaugurated a program to develop a number of systems and techniques which will be employed in the operation of space vehicles. This program, known as DISCOVERER, will, in accordance with the wishes of the Administration, include not only the THOR launchings previously associated with the WS 117L program, but will be continued to include similar projects that are not operationally oriented.

The first such project consists of the THOR vehicles and associated costs previously carried as a part of the WS 117L program. Henceforth, the project will be known as DISCOVERER-THOR project and it will be necessary to establish the identity of this project separate from the WS 117L program. It is recognized that such a division will involve arbitrary distinctions in view of the common items involved and that the division of cost will have to be made on a statistical rather than on accounting basis. Further, it will be necessary that separate development plans and schedules and progress reports be submitted. An ARPA Order to this effect is in process.

Consistent with the separation of these programs, we are tentatively re-allocating our FY 1959 monies so as to show approximately 103 million allocable to DISCOVERER-THOR project and $137 million allocable to the SENTRY program. Similarly, for FY 1960 we have allocated $60 million to DISCOVERER-THOR project and $170 million to the SENTRY program.

In response to your memorandum of November 17, and in confirmation of our several conversations on the subject, the Secretary of Defense and ARPA agreed to the assignment by the Air Force of the operational responsibility for the SENTRY program to the ARDC for the next several years and until final objectives are obtained. It is also agreed that the tentative basic center to be established at or near Offutt Air Force Base at some future date, and any related centers pertinent to the program, will be operated by ARDC.

General Ritland

182

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[redacted]

[illegible]

[redacted] [redacted]

Noting your citation of the many factors involved, ARPA's actions or request for action relating to both DISCOVERER-THOR project and the SENTRY program, will be communicated to the Secretary of the Air Force, Attn: The Deputy Chief of Staff, Development, with copy to the Assistant Secretary of the Air Force for Research and Development.

/s/ Roy W. Johnson
ROY W. JOHNSON
Director

[redacted]

[illegible]

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ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D. C.

[redacted] DEC 5 1958

MEMORANDUM FOR THE UNDER SECRETARY OF THE AIR FORCE

SUBJECT: DISCOVERER-THOR Project and SENTRY Programs

In accordance with our agreement of yesterday, it is requested that the following instructions be forwarded to BMD concerning the DISCOVERER-THOR project and SENTRY programs:

"Recent fiscal determinations incident to the formulation of the 1960 Budget have necessitated the modification of the SENTRY Development Program. Furthermore, the inception of the DISCOVERER Program as it is constituted from elements also creates a requirement for program management determinations.

"In response to these influences, the ARPA staff has proposed a reorientation of the two programs. The details of the proposal have been furnished to Program Management personnel of the Air Force Ballistic Missile Division. Acknowledging the tenuous nature of this proposal until further detailed study can be made by the Project Personnel, it is the purpose of this memorandum to request such a study and present the findings for our joint consideration on the 15th of December. It is our objective to reach a final determination as to the content of the programs for FY 1960 and balance of FY 1959 in their major elements by 17 December.

18

[redacted]

"The actions suggested in the ARPA proposal should each be reviewed with the objective of determining fiscal and project timing implications. Where contract cancellations are involved, an assessment of industrial impact should be made. In general, the goal should be to determine the practicality of making the downward adjustments suggested, the cost in time and money for implementing the new program elements suggested, and alternative suggestions where program elements suggested by the ARPA staff are determined to be impractical.

"For the purposes of this review, it should be assumed the development resources available will amount to $213.3 million in FY 59 and $160 million in FY 60. Intelligence requirements as they might influence the evaluation should be based on the best information that can be made available in the time period provided. It is recognized that fully refined information cannot be made available by the dates suggested herein.

[redacted]

[redacted]

[redacted] [redacted]

However, it seems likely that sufficiently accurate determinations can be made as to permit major decisions which are necessary for the formulation of a final development plan.

"In the interim period, until the major program decisions are finalized, the Air Force Ballistic Missile Division should be directed to withhold any major fund commitments that go beyond the scope of the ARPA proposal. In those areas that might be designated for cancellation, no material procurements should be authorized beyond the absolute minimum necessary for preserving the continuity of engineering effort."

/S/ Roy W. Johnson

Roy W. Johnson
Director

cc: Mr. Lew Mayer, AFABF

[redacted]

RECEIVED
WDD ARDC
6 DEC 1958 P.M.

WDZW

15 Dec '58

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DE RJEZHQ 1087
P 052240Z
FM HEDUSAF
TO RJWZBK/COMAFBMD
INFO RJEZFF/COMARDC
BT
87579 THIS CONFIRMS TELEPHONE CONVERSATION BETWEEN GENERAL BOUSHEY THIS HEADQUARTERS AND COL COOK, AFBMD OF 5 DEC 58. COL LOVE YOUR HEADQUARTERS HAS LATEST INSTRUCTIONS FROM ARPA RELATIVE TO [illegible] OF YOUR PRESENTATION TO ARPA ON 15 DEC. COL LOVE IS CARRYING A COPY OF MEMORANDUM FOR THE UNDER SECRETARY OF THE AIR FORCE, SUBJECT, DISCOVERER-THOR PROJECT AND SENTRY PROGRAMS DATED 5 DECEMBER. REQUEST YOU CONFIRM BY MESSAGE YOUR ABILITY TO MEET 15 DECEMBER DATE.
BT
05/2240Z DEC RJEZHQ

15 DEC
ARPA-USAF
[illegible]

Reply
Attached

62

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WDD ARDC
ACTION WDGE/WDZ
7 DEC 1958 [illegible] ZB
INFO: WDG
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FA 010

PP INGL 2382
DE RJWZNF 18F
P 052223Z
FM OSD, DEP ARMY, WASH D C
TO COMDR ARDC ANDREWS AFB
INFO COMDR AFBMD INGLEWOOD
BT
/S E C R E T/DEF 951903. FROM OSD ARPA SGD JOHNSON.
REF MY LETTER OF NOV 25& 58 CONCERNING BIOMEDICAL PAYLOADS FOR DISCOVERER. IT IS OUR INTENT TO ACCOMPLISH 1 SUCCESSFUL PRIMATE RECOVERY. UP TO A TOTAL OF 3 ATTEMPTS SHOULD BE PLANNED, WITH THE 2 ADDITIONAL ATTEMPTS IF NECESSARY AND DESIRED TO BE IN LIEU OF PAYLOADS IN THE SERIES OF 13 FLIGHT VEHICLES. YOU SHOULD THERFFORE PLAN TO HAVE AVAILABLE INTERNAL COMPONENTS FOR 2 PRIMATE BACKUP PAYLOADS.
BT
THISAC MSG
06/0754Z DEC RJWZNF

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WDSMCC-58-3502

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Copy 1

ARPA's total foreseeable requirement for recurring reports based on this Order.

6. The utilization of equipment and materials procured in connection with this project for other projects is subject to the direction of ARPA. Notwithstanding, final disposition of such equipment and materials shall be made in accordance with standard procedures. Any technical and scientific information relating to work under this Order which may be published from time to time shall give appropriate credit to the ARPA project. No scientific and technical progress and status reports on ARPA's projects or final completion reports prepared specifically at ARPA's request shall be made available to other agencies or individuals without approval of ARPA.

7. Sec/Air shall be responsible for preserving the security of this project in accordance with the security classification assigned and the security regulations and procedures of the Department of the Air Force.

8. Notwithstanding any other provisions of this Order, the Secretary of the Air Force shall not be bound to take any action in connection with the performance of this work that would cause the amount for which the Government will be obligated hereunder to exceed the funds made available, and the obligations to the Secretary of the Air Force to proceed with the performance of this work shall be limited accordingly. The Secretary of the Air Force shall be responsible for assuring that all commitments, obligations, and expenditures of the funds made available are made in accordance with the statutes and regulations governing such matters, provided that whenever such regulations require approval of higher authority such approvals will be obtained from or through the Director, ARPA, or his designated representative.

R. W. Johnson

Roy W. Johnson
Director

1 Incl.:
Attachment No. 1

[redacted]

[redacted]

see amendments
#1, 16 Feb 59
#2, 24 mar 59
#3, 1 apr 59
#4, 20 may 59
#5, 23 Jun 59
#6, 20 Jul 59
#7, 8 Oct 59
#8, 3 Dec 59

[redacted]

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[redacted]

ARPA Order No. 48-59

December 16, 1958 Date

TO: The Secretary of the Air Force
Washington 25, D. C.

[redacted]

1. Pursuant to the provisions of DoD Directive 5105.15, dated February 7, 1958, you are requested to continue on behalf of the Advanced Research Projects Agency with the project specified below. Additional details and directives may be issued by ARPA from time to time and will become a part of this Order when so specified.

2. The study, development, and launch operations associated with the Thor program, heretofore included in ARPA Order No. 9-58 for the Sentry Program, are to be continued as an independent project identified as the Discoverer-Thor Project (U).

3. At the conclusion of the present program review, the costs allocable to this project since July 1, 1958, which have been charged to ARPA Order No. 9-58, shall be identified and transfered to this Order, at which time the funds shall be adjusted by ARPA as appropriate. You are requested to submit to ARPA by January 15, 1959, a financial plan which will be the basis for determining the division of funds.

4. The Director, Advanced Research Projects Agency, will provide policy and technical guidance either directly or through designated representatives. The Secretary of the Air Force will be responsible for arranging for the detailed technical directions necessary to accomplish the specified objectives and to comply with ARPA policy and technical guidance. This general relationship may be specified in greater detail by amendment to this Order if such action is necessary.

5. The Director, Advanced Research Projects Agency, and the Office of the Secretary of Defense will be kept informed of the status of work assigned under this Order by a monthly progress report and a semi-annual technical report to be prepared and submitted in accordance with procedures outlined in Attachment No. 1. These reports represent

[redacted]

[redacted] [redacted]

WDGEU 419-58 4/2

File WDGV
OM

Attachment No. 1 ARPA Order No. 48-59

PREPARATION OF REPORTS

I. Monthly Progress Report

This report will be submitted in two parts, a Narrative Section and a Milestone Progress Section.

Narrative Section. A letter report will be submitted for the first and second months of each calendar quarter by the addressee of the above numbered ARPA Order, giving a narrative account of work performed under the Order. A special report to be prescribed as an Amendment to ARPA Order No. 9 will be substituted in lieu of the letter report for the final month of each calendar quarter. The initial letter report will cover the month of January 1959. Each monthly letter report will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and is due within 10 days following the close of the month reported. The ARPA Order number and subject of the project should be stated in the heading of each report.

The report will be in letter form and generally not exceed three pages in length. It will present a narrative summary of work performed, including technical status, major accomplishments, problems encountered, future plans, and any action required by ARPA. The initial report should include an introductory preface outlining the background, objectives, and assignment of responsibility for the project. All reports should include photographs and illustrations as appropriate. In addition, an autopositive negative (kodalith master) for each illustration should be included, where practical, for use in presentations or reproductions.

Milestone Progress Section. Instructions for preparation of this section, which requires use of a standard format in reporting actual progress against planned progress in accomplishing major milestones, will be issued at a later date.

Superseded

See attachment 1, to Amend #3

II. Semi-Annual Technical Summary Report

A technical summary report will be submitted semi-annually for periods ending June 30 and December 31 of each year. The report will present a concise and factual discussion of technical findings and accomplishments during the period. The initial technical summary report will cover work performed during the period January 1 to June 30, 1959. The report will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and is due within 30 days following the close of the report period. Additional distribution may be specified by ARPA at a future date. Upon completion of the project, a final report will be submitted summarizing the entire project. The final completion report will be submitted in lieu of the regular semi-annual report to reach the Director, ARPA, within 60 days following project completion. The ARPA Order number and subject of the project should be stated in the heading of each report.

Cys: WDG, GV, GE, GEH
WDT, WDC, WDS, WDZ, WDP

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WDZW 30 December 1958

MEMORANDUM FOR GENERAL SCHRIEVER

SUBJECT: Discoverer Launchings

1. It is obvious that the polar orbits of the subject launchings might be a matter of international political concern.

2. We are assuming that the currently approved planning documents give general approval for the series and for each launch.

3. We further assume that action will be taken by yourself or by higher DOD agencies to suspend a particular launch through notification of WDZW if political factors so require. This assumption pertains to the first and all succeeding launches.

SIGNED

HARRY L. EVANS
Colonel, USAF
Director for WS 117L

Copy furnished:
Gen Ritland
WDZ
WDZ - Col Sheppard

[redacted]

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HOW NOW HOW

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WDP/WDC

30 DEC 1958

INFO: WDGE
WDZ
WDX
WDG
WDGTV ✓

HQA017
PP RJWZFK
DE RJEZHQ 332
P 301520Z
FM HQ USAF WASH DC
TO RJWZFK/COMAFBMD INGLEWOOD CALIF
INFO RJEZFF/COMARDC ANDREWS AFB MD
BT
//S E C R E T// FROM AFDAT 54519
SUBJECT IS ARPA ORDER 48-59 DATED 16 DECEMBER 1958
REFERENCE MEMO FOR UNDER SECRETARY OF AF SUBJ: REORIENTATION OF SENTRY PROGRAM DATED 17 DECEMBER 1958 FROM DIRECTOR OF ARPA WHICH LISTED POSSIBLE DETAILED PROGRAM CHANGES AND FUNDING SITUATIION. ARPA ORDER 48-59 STATES IN PART "PAR 2 THE STUDY, DEVELOPMENT AND LAUNCH OPERATIONS ASSOCIATED WITH THE THOR PROGRAM, HERETOFORE INCLUDED IN ARPA ORDER NO 9-58 FOR THE SENTRY PROGRAM. ARE TO BE CONTINUED AS AN INDEPENDENT PROJECT IDENTIFIED AS THE DISCOVER THOR PROJECT".

[redacted]

192

PAGE TWO RJEZHQ 332

"PAR 3. AT THE CONCLUSION OF THE PRESENT PROGRAM REVIEW, THE COSTS ALLOCABLE TO THIS PROJECT SINCE JULY 1, 1958, WHICK HAVE BEEN CHARGED TO ARPA ORDER NO. 9-58 SHALL BE IDENTIFIED AND TRANSFERRED TO THIS ORDER, AT WHICH TIME THE FUNDS SHALL BE ADJUSTED BY ARPA AS APPROPRIATE. YOU ARE REQUESTED TO SUBMIT TO ARPA BY JANUARY 15, 1959, A FINANCIAL PLAN WHICH WILL BE THE BASIS FOR DETERMINING THE DIVISION OF FUNDS."

REQUEST THAT AFBMD PREPARE THE FINANCIAL PLAN AS NOTED ABOVE FOR SUBMISSION TO THIS HEADQUARTERS ON 14 JANUARY AND ARPA ON 15 JANUARY.

BT
30/1525Z DEC RJEZHQ

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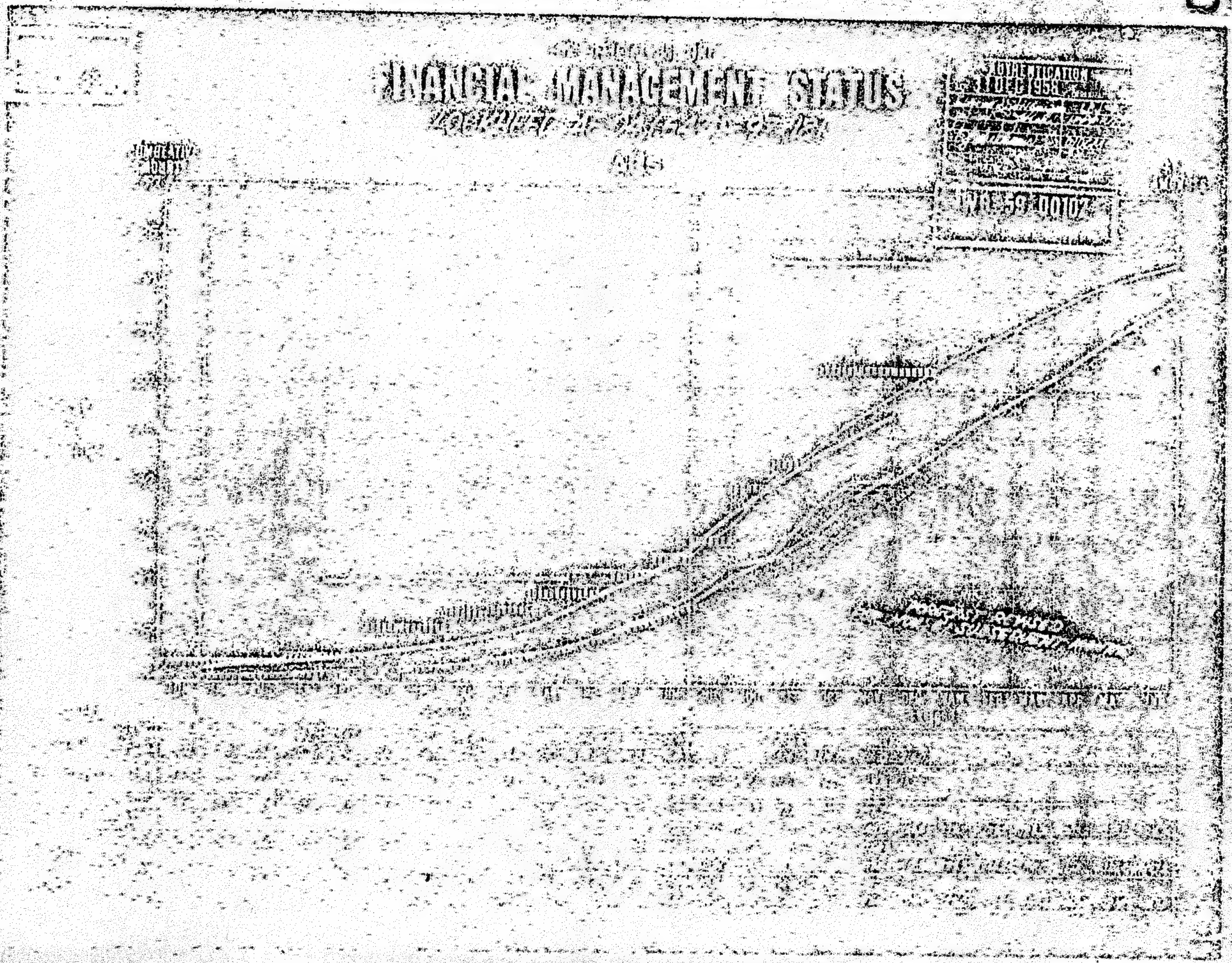
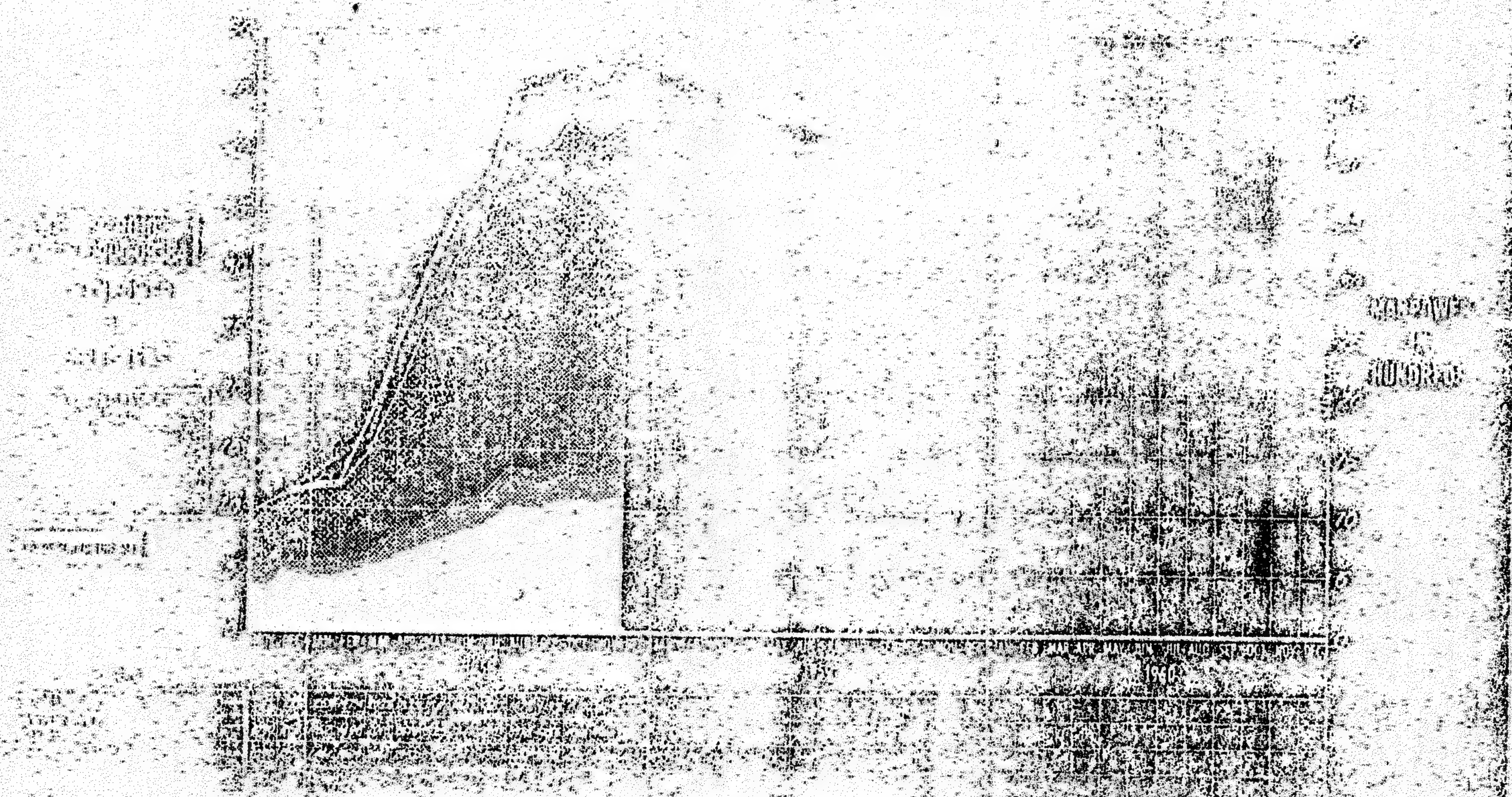

FINANCIAL MANAGEMENT STATUS
IDENTIFICATION
DEC 1958
WE 59 00107

67

p61

CONTRACTOR MANPOWER STATUS



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3 Feb 59

[redacted]

PRIORITY
PRIORITY X AF

COMDR AFBMD (ARDC) LOS ANGELES, CALIF

CMDR FIRST MISSILE DIVISION, VANDENBERG AFB, CALIF

INFO: AFBMD FIELD OFFICE, VANDENBERG AFB, CALIF. [redacted]

SECRET FROM WDZI-1-30-E

PERSONAL FROM GEN SCHRIEVER FOR GEN WADE, 1ST MISSILE DIV, VAFB. FOR WDGEV, FIELD OFFICE, VAFB. MESSAGE IN THREE PARTS. PART ONE: A FIRM SCHEDULE FOR THOR/DISCOVERER LAUNCHES HAS BEEN ESTABLISHED. THIS SCHEDULE CALLS FOR LAUNCHES AT THE RATE OF ONE PER MONTH THROUGH APRIL 1959 WITH A LAUNCH RATE OF TWO PER MONTH THEREAFTER. PART TWO: A REVIEW OF THE FACILITY REQUIREMENTS OF THE DOUGLAS AIRCRAFT COMPANY FOR THE SUPPORT OF THE DISCOVERER PROGRAM USING RECENTLY ACQUIRED EXPERIENCE AT VANDENBERG, HAS REVEALED THAT ADDITIONAL FACILITIES ARE REQUIRED FOR RIM-TYPE ACTIVITIES. AFBMD IS PROVIDING THESE FACILITIES ON AN EXPEDITED BASIS. THE ADDITIONAL FACILITIES ARE A ONE BAY EXTENSION OF THE EXISTING RIM BUILDING AND A TEMPORARY BUTLER-TYPE BUILDING WITH DIMENSIONS OF AT LEAST 40 BY 60 FEET. THE

(CONTINUED) JAH

WDCEM 3 FEB 1959

[illegible]

[redacted]

B. A. SCHRIEVER
Major General, USAF
Commander

[redacted]

WDC copy

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[redacted]

[redacted]

COMDR AFBMD (ARDC) LOS ANGELES, CALIF

BOD DATE OF BOTH OF THESE FACILITIES WILL BE 15 MAY 59, AND THE QUOTE NEED UNQUOTE DATE IS 5 JUNE 59. THESE ARE THE EARLIEST ATTAINABLE DATES FOR THESE FACILITIES. PART THREE: IN ORDER TO CHECKOUT SUFFICIENT THOR BOOSTERS TO SATISFY THE GIVEN LAUNCH SCHEDULE, AN AGREEMENT BETWEEN AFBMD AND THE FIRST MISSILE DIVISION IS REQUIRED FOR EXTENDED USE BY DOUGLAS OF RIM CHECKOUT POSITION NO. 4. THE USE OF THIS CHECKOUT POSITION IS REQUIRED FROM THE CURRENTLY PLANNED RIM TURNOVER DATE OF 1 MARCH 59 UNTIL THE NEW FACILITY IS IN OPERATION APPROXIMATELY 1 JULY 59. I WISH TO CONFIRM WITH YOU AT THIS TIME THE USE OF RIM CHECKOUT POSITION NO. 4 BY DOUGLAS DURING THE TIME PERIOD INDICATED ABOVE.

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-6 FEB 1959 02 39

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INFO: WDG
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TWX017
PP RJWXBK
DE RJWXFK 10
P 052358Z ZFF-2
FM COMDR MISSILE DIV1
TO RJWXBK/COMAFBMD HQ ARDC
INFO ZEN/AFBMD FIELD OFFICE VANDENBERG AFB
BT

/SECRET/C-55. PERSONAL FROM GENERAL WADE FOR GENERAL SCHRIEVERS INFO WDGEV AFBMD FLD OFCE VAFB. REFERENCE YOUR SECRET MESSAGE WDTI 2-38-E8 DATED 3 FEBRUARY 1959. THIS MESSAGE IN FIVE PARTS. PART I. WE AT 1ST MISSILE DIVISION ARE COGNIZANT OF THE NATIONAL IMPORTANCE OF THE THOR/DISCOVERER LAUNCHES SCHEDULED FROM VANDENBERG AFB AND RECOGNIZE THE NECESSITY FOR A RIM BAY POSTION FOR USE BY THE CONTRACTOR IN SUPPORT OF THE PROGRAM. PART II. I WILL INFORM MY PERSONNEL THAT RIM BAY POSITION NUMBER 4 WILL BE MADE AVAILABLE TO THE CONTRACTOR AS NEEDED OR UNTIL 1 JULY 1959. TEMPORARY UTILIZATION OF BAY POSITION NUMBER 4 FOR THE THOR/DISCOVERER PROJECT CANNOT INCLUDE ANY OF THE CHECKOUT EQUIPMENT NECESSARY FOR SUPPORT OF THE SM-75 IWST PROGRAM. PART III. THE USE OF BAY 4 WILL NOT ALTER THE TURNOVER DATE AND 1ST MISSILE EXECUTIVE CONTROL OF THE RIM FACILITY PRESENTLY PLANNED FOR 1 MAR 1959. PART IV. REFERENCE SITING OF TEMPORARY BUTLER BUILDING AND ADDITIONS TO RIM, REQUEST THIS HEADQUARTERS BE CONTACTED IN INITIAL PLANNING STAGES. PART V. IT IS POINTED OUT THAT THE WORKLOAD ASSOCIATED WITH SUPPORTING THE THOR/DISCOVERER LAUNCHES COMBINED WITH SUPPORTING ON VANDENBERG AFB THE RECENTLY PROGRAMMED 720TH GUIDED MISSILE WING HEADQUARTERS AND SUBORDINATE LAUNCH SQUADRON HAS CERTAIN DEFINITE MANPOWER IMPLICATIONS. A MANPOWER ANALYSIS IS BEING INITIATED, THIS DATE. IN VIEW OF THE ABOVE IT MAY BE NECESSARY FOR ME TO SOLICIT YOUR SUPPORT IN DEFENDING ADDITIONAL MANPOWER REQUIREMENTS TO SAC AND USAF.

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11 FEB 1959

Director of WS 117L
ATTN: WDZW

SUBJECT: (U) WS 117L Program

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D. C.

1. Three (3) new development plans, DISCOVERER, SENTRY, and MIDAS, describing the reoriented WS 117L Program, have been forwarded directly to the Assistant Chief of Guided Missiles, Headquarters, USAF. This action has been taken in order to meet the requirements of the Headquarters, USAF, imposed presentation schedule for these plans.

2. Normal distribution will be made to your headquarters immediately upon completion of the reproduction of the plans.

3. These development plans propose joint ARPA-Air Force funding. In each plan Air Force and ARPA costs are separately identified. The separation of the total program cost into Air Force cost and ARPA cost has been made in accordance with available guidance.

4. Briefings on these programs were given to Headquarters, USAF and ARPA during the period 29 January to 4 February 1959. These plans have been drawn up to reflect the Air Force-ARPA agreed funding levels for SENTRY and DISCOVERER and the Air Force recommendations for funding of MIDAS. At the direction of Headquarters, USAF certain costs are not identified in these plans. Separate funding action will be required in some cases.

a. Advance planning (design) funds for Military Construction Program (MCP) items have not been included. The required sums are: FY 58 - $900,000. (already provided), FY 59 - $827,000. formerly on ARPA Order 41-59, and $937,000. in P-313 for MIDAS.

b. Operations and maintenance costs and other support items are not shown. These will be included in the appropriate Annual Financial Plans.

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Cy [illegible] of [illegible]

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5. It must be emphasized that DISCOVERER and SENTRY Programs are interdependent programs and partial approval of either program will require reconsideration of both efforts. Further, in the interests of economy and efficiency, the MIDAS Program is based on the assumption that the proposed DISCOVERER and SENTRY Programs are approved in their entirety.

6. In the past year the WS 117L Program has been plagued with instability, inadequate or untimely decision, or the lack of a decision at all. This instability culminated in the reorientation of this program in December 1958, which is the primary purpose for the submission of these new plans. Additionally, a serious funding problem has been encountered particularly in the present fiscal year. This problem is related to the incremental funding of the WS 117L Program on a month to month basis. This funding condition has made an otherwise difficult job more difficult and has been the cause of considerable concern within AFBMD and its contractors.

7. In order to stabilize the program and initiate contractual actions for the continuation of the program, Air Force Headquarters has been requested to take expeditious action to accomplish the following:

a. Immediate release of the remaining fiscal year 1959 funds.

b. Early coordinated Air Force and ARPA approval of joint programs.

SIGNED

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

Copy furnished:
Assistant Chief of Staff
for Guided Missiles, Hq USAF
WDP

[redacted]

WDZW dl(11 Feb 59)
Maj Ford 1816

[redacted]

WDZW 59-149
Cy 2 of 8

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D.C.

ARPA Order No. 48-59
Amendment No. 1

February 16, 1959 Date

TO: The Secretary of the Air Force
Washington 25, D. C.

The program objectives and related funding for the DISCOVERER program as presented to ARPA February 4, 1959, are, in general, approved.

It is particularly noted that this approval pertains to the 13 vehicle program.

Accordingly, ARPA Order No. 48-59, dated December 16, 1958, is hereby amended to make available $104,300,000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects Agency, Department of Defense."

The decrease of $1,700,000 in the amount authorized from the $106,000,000 requested in the Development Plan has been explained to your staff.

The Development and Funding Plan, dated January 30, 1959, pertaining to the DISCOVERER program, is being reviewed and specific comments relating thereto will be provided for further program guidance.

Roy Johnson

Roy [illegible]. Johnson
Director

Copy to: Commander, ARDC

WDG-V 73

JOINT MESSAGEFORM

SECURITY CL CATY. V [redacted]

SPACE BELOW RESERVED FOR COMMUNICATION CENTER

[redacted]

PRECEDENCE		TYPE MSG (Check)			ACCOUNTING SYMBOL	ORIG. OR REFERS TO	CLASSIFICATION OF REFERENCE
		BOOK	MULTI	SINGLE			
ACTION	~~PRIORITY~~		x		AF	x	
INFO							

FROM:

COMDR, AFBMD (ARDC), LOS ANGELES, CALIFORNIA

SPECIAL INSTRUCTIONS

TO: COFS, USAF, WASH DC

INFO: COMARDC, ANDREWS AFB, MD [redacted]

SECRET FROM WDPP-3-1.

HQ USAF FOR AFCGM, INFO FOR AFCGM-A PERSONAL FOR GREER FROM RITLAND, HQ ARDC FOR RDZGW REFERENCE MR. SWEETZER'S MEMO FOR RECORD DATED 23 JAN 59, SUBJ: BOOSTERS FOR SPACE PROGRAMS AND TWX AFCGM 56822, 19 FEB 59 WHICH REQUESTED COMMENTS ON A MONTHLY REPORT TO KEEP HQ USAF INFORMED ON A PERIODIC AND TIMELY BASIS OF ALL AF COMMITMENTS IN SUPPORT OF SPACE PROGRAMS. SUGGEST YOU DO ALL POSSIBLE TO PRECLUDE ARPA/NASA IMPOSING DETAILED SCHEDULING AND PROGRAMMING INFORMATION REQUIREMENTS ON THE AIR FORCE. THE IMPLICATIONS OF A DETAILED SCOREKEEPING AT OSD LEVEL.

DATE	TIME
7	
MONTH	YEAR
MAR	1959

WRITER	
SYMBOL	WDPP [redacted]
TYPED NAME AND TITLE (Signature, if required)	~~COL HUGHES/~~
PHONE	
PAGE NR.	1
NR. OF PAGES	3
SECURITY CLASSIFICATION	[redacted]

RELEASER	
SIGNATURE	SIGNED
TYPED (or stamped) NAME AND TITLE	C. E. HUGHES Colonel, USAF Assistant for Programming

DD FORM 1 MAY 55 173 REPLACES DD FORM 173, 1 OCT 49, WHICH WILL BE USED UNTIL EXHAUSTED

DP-59-

JOINT MESSAGEFORM - CONTINUATION SHEET

SECURITY CLASSIFICATION [redacted]

FROM:
COMDR, AFBMD (ARDC), LOS ANGELES, CALIFORNIA [redacted]

SUGGESTS INFLEXIBLE CONTROLS WHICH WILL MAKE IT EXTREMELY DIFFICULT IF NOT IMPOSSIBLE TO BEST ACCOMPLISH SPACE PROGRAMS INVOLVING THE LIMITED RESOURCES ASSOCIATED WITH HIGHEST PRIORITY BALLISTIC MISSILE WEAPON DEVELOPMENTS. OUR LETTER TO THE CHIEF OF STAFF, USAF, DATED 11 FEB 59, SUBJ: NASA AND ARPA SPACE PROGRAM REQUIREMENTS INDICATES OUR CONCERN OVER ATLAS MISSILE AND LAUNCH STAND REQUIREMENTS FOR SPACE PROGRAMS DURING THE CRITICAL FY 1960 PERIOD. AN AFBMD LETTER WILL FOLLOW SHORTLY WHICH GIVES OUR BEST ESTIMATE OF OUR CAPABILITY TO SUPPORT CERTAIN SPACE PROGRAMS AT AMR DURING THE CRITICAL PERIOD. OUR SUPPORT CAN BE PROVIDED [illegible] ONLY IF THIS DIVISION IS ALLOWED TO PERFORM DETAILED ALLOCATION AND SCHEDULING WITH SUFFICIENT FLEXIBILITY TO ALLOW MESHING OF SPACE LAUNCHINGS AND BOOSTER ASSIGNMENTS WITH OTHER R&D PROGRAMS. IF, AS SUGGESTED BY REFERENCED TWX, WE ARE REQUIRED TO PROVIDE TO YOUR HEADQUARTERS, ARPA AND NASA PERIODIC DETAILED REPORTING OF BOOSTER ALLOCATIONS, STAND LOADING, PRODUCTION VS REQUIREMENTS, ETC, THEN NECESSARY FLEXIBILITY IN OUR [illegible] SCHEDULING IS DESTROYED AND

302

SYMBOL	PAGE NR	NR OF PAGES	SECURITY CLASSIFICATION
WDTP	2	3	[redacted]

DD FORM 173-1

U. S. GOVERNMENT PRINTING OFFICE

JOINT MESSAGEFORM - CONTINUATION SHEET

SECURITY CLASSIFICATION [redacted]

FROM:

COMDR, AFBMD (ARDC), LOS ANGELES, CALIFORNIA

[redacted]

ARPA AND NASA MUST RECOGNIZE A 16 MONTH LEAD TIME FOR ATLAS PRODUCTION PLUS AN 18 MONTH LEAD TIME FOR ADDITIONAL STAND CAPACITY AND MUST ESTABLISH FIRM SPACE PROGRAM REQUIREMENTS CONSISTENT WITH THAT LEAD TIME. THIS DIVISION HAS ENDEAVORED IN THE PAST AND WILL CONTINUE TO KEEP HQ USAF APPRAISED THROUGH NORMAL COMMUNICATIONS CHANNELS OF PROBLEMS CONCERNED WITH SUPPORTING SPACE PROGRAMS. IT IS RECOMMENDED THAT NO PERIODIC DETAILED REPORTING PROCEDURES BE IMPOSED. THE EXISTENCE OF SUCH REPORTS WOULD SOONER OR LATER BECOME KNOWN TO OSD, ARPA AND NASA AND WE WOULD BE REQUIRED TO PROVIDE DISTRIBUTION WITH THE RESULTING PROBLEMS AND DIFFICULTIES DESCRIBED ABOVE.

[redacted]

SYMBOL	PAGE NR	NR OF PAGES	SECURITY CLASSIFICATION
WDDP	3	3	[redacted]

U. S. GOV [illegible] PRINTING OFFICE

JOINT MESSAGEFORM

SECURITY CLASS [redacted]

94

SPACE BELOW RESERVED FOR COMMUNICATION CENTER

PRECEDENCE	TYPE MSG (Check)			ACCOUNTING SYMBOL	ORIG. OR REFERS TO	CLASSIFICATION OF REFERENCE
	BOOK	MULTI	SINGLE			
ACTION PRIORITY		X		AF		
INFO						

FROM: COMDR AFBMD (ARDC), LOS ANGELES, CALIF

SPECIAL INSTRUCTIONS

DISTRIBUTION

✓WDZ
WDZB

TO: DIRECTOR ARPA, WASH D. C.

INFO: COFS USAF, WASH D. C.

COMDR ARDC, ANDREWS AFB, MD.

LOCKHEED MISSILES AND SPACE DIVISION, PALO ALTO CALIF

CHIEF, AFBMD FIELD OFFICE, PALO ALTO, CALIF

SECRET FROM WDZW 3-15-E. FOR AFCGM AND AFDAT AT USAF, FOR RDGZM AT ARDC AND FOR MR. [illegible] AT LMSD. SUBJECT: DISCOVERER II-170-[illegible]. IN VIEW OF THE ADVERSE PUBLIC REACTION THAT WOULD RESULT IN THE EVENT OF UNSUCCESSFUL RECOVERY OF SUCH VEHICLE, COMMANDER AFBMD HAS DECIDED THAT NO BIO MEDICAL PAYLOAD WILL BE FLOWN ON DISCOVERER II. ~~FURTHER IT IS NOT PLANNED TO ORBIT A BIO MEDICAL PAYLOAD UNTIL SUCCESSFUL RECOVERY FROM ORBIT HAS BEEN ACHIEVED.~~

[redacted]

WDCF Reading File

DATE	TIME
[illegible]	
MONTH	YEAR
MAR	19[illegible]

WRITER

SYMBOL: WDZW

TYPED NAME AND TITLE (Signature, if required): [illegible], Colonel, USAF/ch

PHONE: [illegible] PAGE NR. 1 NR. OF PAGES 1

SECURITY CLASSIFICATION: [redacted] [redacted]

RELEASER

SIGNATURE: ORIGINAL SIGNED: B. A. SCHRIEVER

TYPED (or stamped) NAME AND TITLE: B. A. [illegible]

Cy 5-6

DD FORM 1 MAY 55 173 REPLACES DD FORM 173, 1 OCT 49, WHICH WILL BE USED UNTIL EXHAUSTED

17 75

[redacted]

RECEIVED
ARDC

WDZ/WDP

18 MAR 1959 17 19

WDZW/WDGE
WDG
WDG, WDEV

File 48-59
01

HQA011
PP RJWZPK
DE RJE7HQ 350
P 181447Z
FM HQ USAF
TO RJWZP /AFPMD INGLEWOOD CALIF
INFO RJEZFF/ARDC ANDREWS AFB MD
BT

//CONFIDENTIAL//FROM AYAFF 57888 REFERENCE IS MADE TO ARPA ORDER 48-59, AMENDMENT 1, AND YOUR TWX WDZW 3-2-E DTD 6 MAR 59. REFERENCED ARPA ORDER REDUCED VEHICLE REQUIREMENTS FOR THIS PROGRAM TO 13 IN LIEU OF ORIGINAL 19 PRESENTLY ON PROCUREMENT IN ACCORDANCE WITH NITIAL DEVELOPMENT PLAN. YOUR DIVISION IS DIRECTED TO HOLD 6 BOOSTERS NOT COVE ED BY ARPA ORDERS OF AF REQUIREMENTS ON PROCUREMENT AND IN THE PRODUCTION PROGRAM UNTIL FURTHER NOTICE FROM THIS HQ. THESE BOOSTERS ARE BEI RESERVED BY THE AFPMC FOR OUTHER PROGRAMS OF ARPA OR AF AS REQUIRED. AT SUCH TIME AS FUNDS ARE REQUIRED TO BE UTILIZED FOR OTHER FACETS OF ARPA ORDER 48-59, YOUR DIVISION WILL NOTIFY THIS HQ WHICH WILL TAKE NECESSARY ACTIONS SO THAT CANCELLATION OR TERMINATION OF THESE BOOSTERS MAY BE AVOIDED.

BT
18/1459Z MAR RJE7HQ

[redacted]

205

NNNN

[illegible]
C.I.T.
Institute of Technology

[redacted]

[redacted]

CONFIDENTIAL

[redacted]

76

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
Air Force Unit Post Office
Los Angeles 45, California

In reply address both communication and envelope to:

Director of WS-315A
Attn: WDTI

18 MAR 1959

Mr. Donald W. Douglas, Jr.
President
Douglas Aircraft Company, Inc.
3000 Ocean Park Boulevard
Santa Monica, California

[redacted]

Dear Mr. Douglas:

A review of material recently presented to the Air Force Ballistic Missile Division concerning problems arising from failures and abnormalities in equipment which affect the reliability of the Thor Weapon System does not show in definable terms, the existence or the responsibilities of a reliability organization within the Douglas Aircraft Company. In your failure reporting system, primary emphasis rests upon your inspection group which has no functioning reliability organization. Although a reliability organization at the Douglas Aircraft Company exists for Thor, it has been apparent to us that this group does not have evidenced top management support and is located in a position of low responsibility in your management structure. Our true concern is that no reliability organization, nor the information derived therefrom, can be satisfactory unless it is properly manned and placed at such a level within the management structure of a company as to make it the controlling agency for the follow-up of failures and malfunctions in quality control, engineering, management, inspection, and technical writing agencies within the company. This role within your company is given to your inspection group and one cannot find real evidence that they, in fact, do accomplish this mission.

It is therefore proposed that you review the structure of your reliability groups insofar as their organization and stature is concerned that you can satisfy yourself that you are adequately prepared to meet the reliability challenge that faces us. The Thor Program has been outstanding in that as a major weapon system, it was deployed in the field only three years after its inception. In the wake of this accomplishment, we have the equally prodigious task of achieving overall system reliability of 80 to 90 percent by the end of this year.

[redacted]

To insure that we will realize this goal, we request that the Douglas Aircraft Company take the necessary steps to establish a strong reliability group to serve as a controlling agency in this area; that it maintain a responsive failure reporting system that is consistent with our stated requirements and that it make maximum use of the facilities that are now available in order to conduct a thorough component and environmental test program.

We consider the entire subject of reliability as one that deserves the most detailed management attention on the part of Douglas and the Air Force, and we propose that a top management discussion be held on this subject during the month of March wherein your company can detail to us the steps that are proposed to meet our stated reliability objectives.

Sincerely,

B. A. Schriever

B. A. SCHRIEVER
Major General, USAF
Commander

[redacted]

ADVANCED RESEARCH PROJECTS AGENCY
Washington 25, D. C.

opr

ARPA Order No. 48-59
Amendment No. 2

March 24, 1959 Date

TO: The Secretary of the Air Force
Washington 25, D. C.

The Development and Funding Plan, dated January 30, 1959, for the DISCOVERER program, is hereby approved. This approval pertains to the 13-vehicle program.

Further program guidance will be in accordance with Paragraph 4 of the basic Order.

Roy Johnson

Roy W. Johnson
Director

Copy to: Commander, ARDC

78

Om

[redacted]

[redacted]

ADVANCED RESEARCH PROJECTS AGENCY
Washington 25, D. C.

ARPA Order No. 48-59
Amendment No. 3

April 1, 1959 Date

TO: The Secretary of the Air Force
Washington, D. C.

1. Paragraph 5, ARPA Order No. 48-59, dated December 16, 1958, is superseded by the following. Attachment No. 1 to the basic Order is superseded by Attachment No. 1 to this Amendment.

> The Director, Advanced Research Projects Agency, will be kept informed of the status of work assigned under this Order by a Monthly Progress Report, a Quarterly Progress Report, and a Semiannual Technical Summary Report, to be prepared and submitted in accordance with procedures outlined in Attachment No. 1. These reports represent ARPA's presently foreseeable requirements for reporting under ARPA Order No. 48-59.

2. Distribution of AFBMD reports required by ARPA on work performed under ARPA Order No. 48-59 to agencies within USAF will be decided by AFBMD in consonance with established USAF procedures. Requests for copies of these reports by agencies outside USAF will be referred to ARPA for approval.

202

Roy W. Johnson
Director

[redacted]

WDG
WDT
WDX
WDC
WDGEH
WDGFC
WDFG
WDGC
WDIP

1 Incl:
Attachment No. 1

Copy to: Commander, ARDC
Commander, AFBMD

[redacted]

Upon removal of attachment this document becomes Unclassified.

[illegible]

Attachment No. 1

ARPA Order No. 48-59
Amendment No. 3

PREPARATION OF REPORTS [redacted]

I. Monthly Progress Report

a. Narrative Section. A letter report will be submitted by AFBMD giving a narrative account of work performed under ARPA Order No. 48-59. The letter report will cover work performed each month with the exception of the last month (March, June, September and December) of each calendar quarter. The quarterly progress report prescribed below will be submitted in lieu of the letter report for the last month of each calendar quarter. The initial letter report under this directive will be for the month of April 1959. Letter reports will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and are due within 10 days following the month reported.

The report will be in letter form, preferably not exceeding three pages, and will present a brief narrative summary of progress during the reporting period. Each report should make specific reference to the following topics: (1) technical status, (2) problems encountered, (3) work schedules, and (4) action required by ARPA. Photographs and illustrative material will be submitted as appropriate. The ARPA Order number, name of contractor, date of contract, contract number, amount of contract, and title of the project should be stated in the heading of each report.

b. Milestone Section. Instructions for preparation of a milestone progress report, which requires use of a standard format in reporting actual progress against planned progress in accomplishing major milestone, will be issued at a later date.

II. Quarterly Progress Report

The purpose of the quarterly progress report is to provide the President and the Secretary of Defense and their staff with periodic summary information by which they may be kept informed of overall progress and results in certain of the satellite projects.

Frequency and Due Date. The quarterly progress report will be prepared for submission to the President each calendar quarter and will show a summary of progress and significant events during the

[redacted]

quarter. The report should reach ARPA no later than the 11th of the month following the close of the quarter reported. When the 11th falls on a non-workday, the report will be due the following workday. The initial report under this directive will be for the quarter ending March 31, 1959.

Content. The quarterly progress report will cover the progress, special achievements, problems encountered, schedules and overall status of the program. It is essential that the content be carefully organized and that the material is presented briefly, clearly and concisely.

Format.

PART A. Brief of Progress During the Quarter. The brief should not exceed one-half page in length and should present the outstanding highlights of progress and status of the program.

PART B. Topical Summary. The topical summary consists of a series of summary headings, each of which is followed by a summary paragraph or paragraphs. The summary paragraphs are not limited in number but generally should not exceed 15 lines in length. Each paragraph should be abstracted in a marginal heading appearing at the left margin opposite the first line of the paragraph. All elaborative detail should be relegated to Part C and reference noted thereto, as appropriate. Suggested summary headings for the DISCOVERER Project are:

DISCOVERER PROJECT

DISCOVERER FLIGHTS

Flight I
Flight II, etc.

FACILITIES AND SITES

Launch
Tracking

GENERAL

Satellite Airframe Subsystem
Satellite Propulsion Subsystem

[redacted]

Attachment No. 1 [redacted] ARPA Order No. 48-59
Amendment No. 3

GENERAL (continued)

Auxiliary Power Subsystem
Satellite Guidance and Control Subsystem
Data Handling Subsystem
Biomedical Recovery Program

These headings may be revised or added to by the preparing agency from time to time, as appropriate.

PART C. Descriptive Detail. All detailed description and back-up information considered necessary to the completeness of the report will be confined to Part C. Examples are description and layout of tracking stations, map sketches of location of facilities, and details of design and testing of equipment. A glossary sheet listing standard equipment and systems terminology and specifications should be included.

Photographs and Sketches. Photographs and sketches selected to show progress of the work and depict development of equipment should accompany each report. To facilitate printing, photographs and sketches will be in black-and-white glossy finish on 8X10-1/2-inch paper. Each photograph should contain some commonly known object to indicate scale and be clearly captioned.

General. The quarterly progress report will be assembled with those of other satellite projects into a single Department of Defense Military Satellite Program Progress Report and transmitted to the President. It is desired that the format of the report to the President be carefully followed in preparing the report for your project to enable ARPA to print and transmit the consolidated report to the White House with minimum rewriting and editing delay.

218

III. Semiannual Technical Summary Report

A technical summary report will be prepared semiannually for periods ending June 30 and December 31 of each year. The report will present a concise and factual discussion of technical findings and accomplishments during the period. Six copies of the report will be submitted to the Director, Advanced Research Projects Agency, and are due within 30 days following the close of the report

[redacted]

[redacted]

period. Upon completion of the project, a final report will be submitted summarizing the entire project. The final completion report will be submitted in lieu of the regular semiannual report to reach the Director, Advanced Research Projects Agency, within 60 days following project completion. The ARPA Order number, name of contractor, and title of the project should be stated in the heading of each report.

[redacted]

[redacted]

99

17-59

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D. C.

ARPA Order No. 17-59
Amendment No. 4

April 10, 1959 **Date**

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D. C.

ARPA Order No. 17-59, dated September 4, 1958, as amended, is hereby further amended to specify the approved Tasks included therein.

Task No. 1 - Provide one THOR-based vehicle for the TIROS project. The specifications for this vehicle, its launch schedule, and other matters will be specified by NASA. Of the funds provided in this Order, $2 million pertain to this Task for covering estimated costs already incurred. See amend #5, 13 apr 59

See Arpa Order 95-60

Task No. 2 - Develop an upper stage vehicle AJ10-104. Estimated cost, $1,708,000.

See Arpa Order 96-60

Task No. 3 - Modify the Bell-Hustler stage to obtain dual burning capability, simplify guidance and control system, structural simplification such that payloads of arbitrary shapes may be carried, and increased propellant carrying capacity. Estimated cost, $5,150,000.

Pg 3

See ARPA Order 97-60

Task No. 4 - Provide for the delivery and launching at AMR of a THOR-Delta and a THOR-104 suitable for the injection of the Transit payloads of about 215 pounds into 400 N. Mi. high circular orbits. Estimated cost, $7,630,000.

See ARPA Order 98-60

Task No. 5 - Provide for the delivery and launching at AMR of two THOR-104 vehicles suitable for the injection of the 500 pounds Courier payloads into 650 N. Mi. high circular orbits. Estimated cost, $7,994,000.

[redacted]

[redacted]

C8-125685

WDG-110

[redacted]

ARPA Order No. 17-59
Amendment No. 4

See ARPA Order 97-60

Task No. 6 - Provide for the delivery and launching at PMR of two THOR-Hustler (modified) vehicles suitable for the injection of the 215-pound Transit 2 payload into 400 N. Mi. high circular orbit. Estimated cost, $7,660,000.

The desired launch schedule for Tasks Nos. 4, 5, and 6 is set forth in Attachment No: 1 to this Amendment.

The Tasks listed above supersede paragraphs 1, 2, and 3 of Amendment No. 3, dated November 26, 1958.

The estimated total cost of Tasks Nos. 2 through 6 is $30,142,000.

The fund availability under ARPA Order No. 17-59 is hereby increased from $5,090,000 to a new total of $18,300,000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects Agency, Department of Defense." Additional funds for Tasks No. 2 through 6 will be made available upon the availability of FY 1960 funds.

It is requested that development and funding plans be submitted for Tasks Nos. 2 through 6 as soon as possible.

Task #7 added.
see Amend #6,
18 May 59

Roy W. Johnson
Director

1 Incl.:
Attachment No. 1
(Launch Schedule)

Copy to. Secretary of the Air Force
Administrator, NASA

[redacted]

Q8-1256P3
(WDG-117)

[redacted]

Attachment No. 1

ARPA Order No. 17-59
Amendment No. 4

LAUNCH SCHEDULE, TASKS Nos. 4, 5, and 6

				FY 1959				FY 1960											
Project	N. M.	P/L Wgt.	Range	CY 1959										CY 1960					
				M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Transit 1 a	400	215	A						TD										
Transit 1 b	400	215	A												TE				
Transit 2 a	400	215	P													TH			
Transit 2 b	400	215	P																TH
Courier 1 a	650	500	A											TE					
Courier 1 b	650	500	A														TE		
Combined Schedule									TD					TE	TE	TH	TE		TH
At AMR									TD					TE	TE		TE		
At PMR																TH			TH

TD - Thor Delta
TE - Thor 104
TH - Thor Hustler (Mod.)

Each b is a backup. In case of successful first launch, the backup would be rescheduled.

[redacted]

C 8-125683
WDG-110

80

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON 25, D.C.

ARPA Order No. 17-59
Amendment No. 5

April 13, 1959 Date

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D.C.

Pursuant to an Agreement between the Department of Defense and the National Aeronautics and Space Administration (copy attached), the responsibility for the technical and management direction for the THOR-based booster for the meteorological satellite project, designated TIROS, as specified in Task No. 1 of Amendment No. 4 to ARPA Order No. 17-59, dated September 4, 1958, as amended, has been transferred to the National Aeronautics and Space Administration.

Accordingly, the ARPA reporting requirements pertaining to Task No. 1 of Amendment No. 4 to ARPA Order No. 17-59, dated September 4, 1958, as amended, are terminated. Title to facilities and non-expendable equipment procured under Task No. 1 will be determined upon completion of the work in accordance with the Agreement.

You are authorized to use funds remaining on Task No. 1 for the work as directed by NASA, in accordance with the Agreement, but ARPA assumes no responsibility for obligations and expenditures in excess of $2,000,000.

Roy Johnson
Roy W. Johnson
Director

1 Inclosure (Addressee only)
Agreement

81

[redacted]

[redacted]

[redacted]

20 APR 1959

WDG

Mr. L. Eugene Root
Vice President and General Manager
Lockheed Aircraft Corporation
Missiles and Space Division
3251 Hanover Street
Palo Alto, California

Dear Mr. Root:

Because of my deep concern over our ability to meet the established Discoverer launch schedule, the factors affecting launch rate have recently been carefully examined. Inclosure No. 1 is a Study prepared by Colonel Cody at Vandenberg Air Force Base, while inclosure No. 2 is an earlier report to the Director, Satellite Systems. Both studies reveal a number of conditions which could defeat the schedule. A recent letter from the Douglas Aircraft Company asking for relief from their schedule is evidence that the situation is recognized by field activities.

The inclosed reports show especially that current planning for the application of manpower, the scheduling of tests and modifications and the occupation time of facilities, makes insufficient allowance for troubles which inevitably will arise. For example, Lockheed Missiles and Space Division manning at Vandenberg Air Force Base allows only for a one-shift operation working on only one vehicle at a time. Vehicles are arriving at the base with an excessive number of modifications yet to be made. Successive vehicle and test equipment malfunctions at Santa Cruz have imposed many unscheduled delays. No determined effort to correct these conditions is evident at the present time.

The purpose of this letter is to convey to you my sincere conviction that the current Lockheed Missiles and Space Division

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[illegible]

[redacted]

[redacted]

course of action will lead to schedule slippage. I am equally certain that your desire is as strong as mine to meet the Discoverer milestones, recognizing the great national importance of this project. The task then becomes one of determining what steps are to be taken in order to assure success. I would greatly appreciate your giving the problem your immediate attention and an early reply outlining the manner in which a solution can be reached.

Sincerely,

SIGNED

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

2 Incls:
1. (S) Study, (Discoverer Launch Schedule), WDZEV 59-3-73, Cy 1 of 7
2. Report by WS 117L Project Office on Discoverer Launch Schedule, dtd 13 Feb 59, (S) WD-59 01394, Cy 2 of 10 Controlled by WDZW 59-247

[redacted]

[redacted]

29 Apr

GEN. RITLAND OK

ONE (1) DAY AFTER THIS WIRE WAS RECEIVED THE DEVELOPMENT PLAN AND A COVER LETTER TO MR. MACINTYRE WAS DISPATCHED TO USAF / SOME SPEED!

R W Curtin

Historian's Note:
Msg, AFDAT 59353, 27 Apr 59, was attached. see reverse side

WDD ROUTING SLIP

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Maj Gen Schriever							
Brig Gen Ritland	3					✓	
Col Wickland							
Col Hamilton	2						
Col Nunziato							
Maj Poe							
Capt Bosler							
Capt Flippo							
Lt Erickson	1						
Sibyl							
Virginia							
Barbara							
Mary Ruth							
Gloria							
Sgt Gamble							

Remarks

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Reverse side

JOINT MESSAGEFORM

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84

SPACE BELOW RESERVED FOR COMMUNICATION CENTER

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INFO				X	AF		

FROM: AFBMD-ARDC/AMC BALLISTIC MISSILES CENTER
LOS ANGELES, CALIFORNIA

TO: LOCKHEED AIRCRAFT CORPORATION
MISSILES & SPACE DIVISION
PALO ALTO, CALIFORNIA

PALO ALTO 91

SPECIAL INSTRUCTIONS

/CONFIDENTIAL/ LBJP-4-15-E. FOR MR. JOE WINGERD. REFERENCE REQUEST FOR PROPOSAL DISCOVERER PROGRAM. DESIRE YOU QUOTE ON BASIS OF TOTAL OF TWENTY-FIVE FLIGHTS, PER CONVERSATION WITH MR. PROCTOR 28 APRIL. THIS WILL NOT DELAY SUBMITTAL OF PROPOSAL. IF ABOVE CHANGE WILL DELAY PROPOSAL, REQUEST TELEPHONE ADVICE BEFORE PROCEEDING.

[redacted]

93

DATE 29	**TIME** 1630
MONTH APRIL	**YEAR** 1959

WRITER

SYMBOL LBJP

TYPED NAME AND TITLE *(Signature, if required)* E.S.SILBERMAN, CONTRACTING OFFICER

PHONE 2713 **PAGE NR.** 1 **NR. OF PAGES** 1

SECURITY CLASSIFICATION

RELEASER

SIGNATURE Eugene S Silberman

TYPED *(or stamped)* **NAME AND TITLE**
for JAMES S. SEAY, LT COLONEL, USAF
DIRECTOR OF SATELLITE SYSTEMS

60 LBJJ-78

59-LBJ-3380 Cy 1 of

DD FORM 173 MAY 58 REPLACES DD FORM 172, 1 OCT 49, WHICH WILL BE USED UNTIL EXHAUSTED

-558 Discov Folder 2 Negotiation

11-1